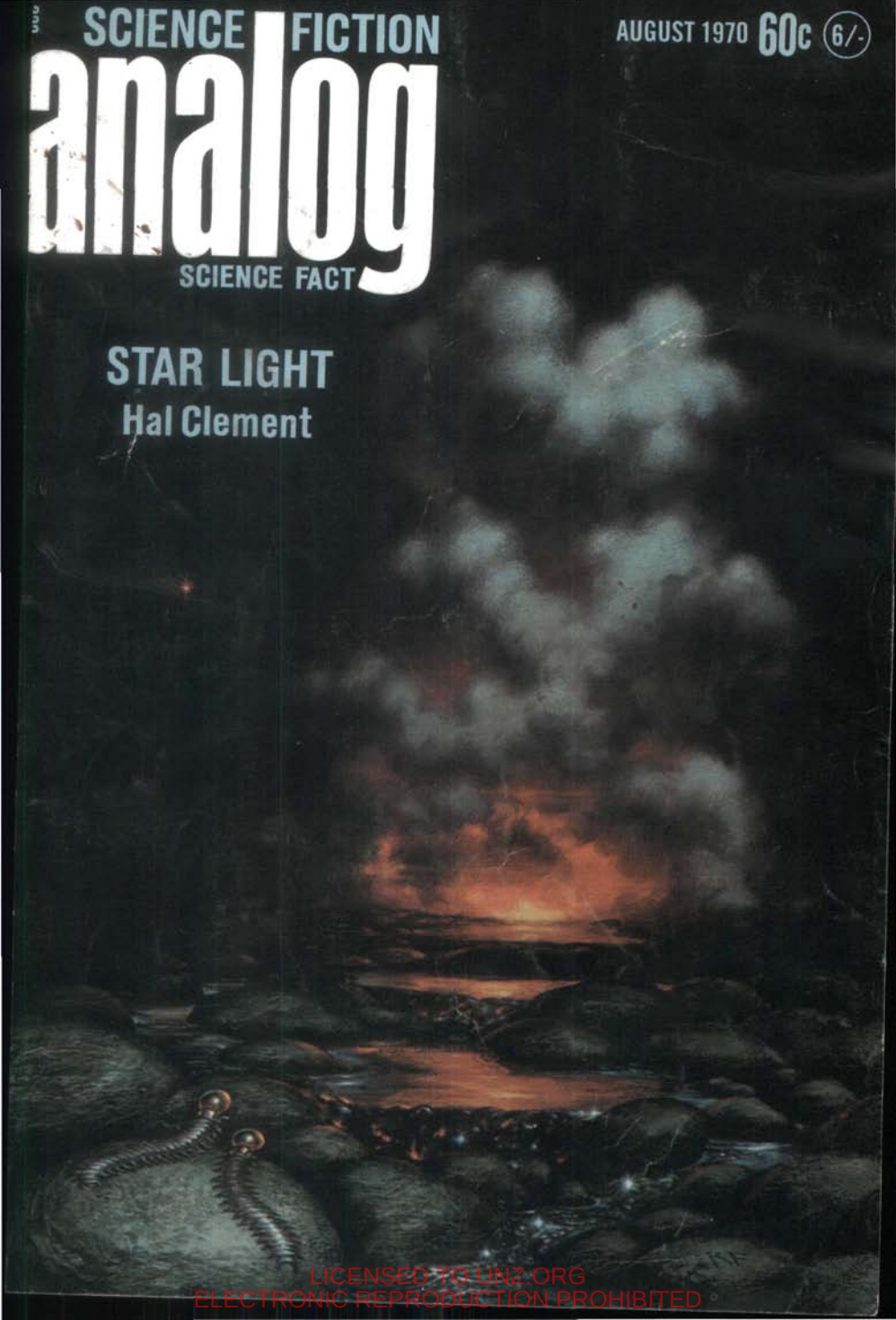
SCIENCE FICTION
# analog
SCIENCE FACT

AUGUST 1970 60c 6/-

## STAR LIGHT
Hal Clement



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ADVERTISING COUNCIL

SMOKEY

Only you can prevent forest fires.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

SCIENCE FICTION SCIENCE FACT
# analog

40TH YEAR ANNIVERSARY

JOHN W. CAMPBELL
Editor
KAY TARRANT
Assistant Editor
HERBERT S. STOLTZ
Art Director
ROBERT E. PARK
Business Manager &
Advertising Manager

NEXT ISSUE ON SALE
AUGUST 11, 1970
$6.00 per year
in the U.S.A.
60 cents per copy

Cover by
Kelly Freas

Vol. LXXXV, No. 6 AUGUST 1970

## SERIAL

STAR LIGHT, Hal Clement ..... 9
(Part Three of Four Parts)

## NOVELETTES

MEET A CRAZY LADY WEEK, W. Macfarlane .... 66
BRILLO. Ben Bova and Harlan Ellison ..... 134

## SHORT STORIES

HEAVY THINKER, Howard L. Myers ..... 110
EXCELSIOR! Robert Chilson ..... 125

## SCIENCE FACT

BACKPACK SPACECRAFT
Walter B. Hendrickson, Jr. ..... 96

## READER'S DEPARTMENTS

THE EDITOR'S PAGE ..... 4
IN TIMES TO COME ..... 65
THE ANALYTICAL LABORATORY ..... 124
THE REFERENCE LIBRARY, P. Schuyler Miller 164
BRASS TACKS ..... 173

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The greatest cliff-hanger in history is just ended as I write this—Apollo 13 is back on Earth, and the three astronauts on board the *Iwo Jima*.

It was unarguably the greatest cliff-hanger in history—who else ever hung over a quarter-million mile cliff while the whole world listened in for some eighty hours of brilliant technological improvisation?

# CLIFF-HANGER

*editorial by John W. Campbell*

Naturally there are all sorts of questions now about how it can be kept from happening again—but the basic answer will be: "You can't prevent that sort of thing."

Perhaps the greatest tribute to human technological workmanship is that only one man—one Russian cosmonaut—has lost his life in a space accident. We've lost several astronauts—as have the Russians—in accidents here on Earth, in crashed planes, in the burning Apollo test capsule—but only one man has actually been lost in spaceflight proper.

There's the old saying "God helps those who help themselves," and perhaps that applies—those, who work hard and thoughtfully toward perfection, are rewarded with good luck above and beyond the direct results of their efforts.

What caused the oxygen tank to blow in the Apollo 13 service module isn't yet known; we do know that it was the first step in the chain of disaster. The extent of that destruction wasn't realized when it happened—wasn't known, actually, until, just before final reentry, the astronauts had a chance to see the gaping wound in the side of the big service module. But they did realize very quickly that they could not trust any part of the service module, and did not dare attempt to use it in any way. There were some twenty tons of high-energy fuel remaining in that module's big tanks—and might be leaking. They didn't dare call on the big service module engine—it might be cracked, and the first added strain cause it to blow out with all the fury of those twenty tons of fuel.

The Apollo 13 was some 200,000 miles out from Earth when it happened; the three major parts of the ship already rearranged from the launch configuration into the lunar approach configuration, with the LM moved out of its housing and attached to the command module, so it was immediately accessible to the astronauts.

Had the accident happened near Earth, shortly after the translunar injection "burn" that sent them on their way toward the Moon, the LM would not have been accessible; there would have been no life-saver available.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

If the accident happened after they went into lunar orbit, and separated the LM from the command and service modules—there would have been no rescue. The LM would not have been able to rendezvous with and reattach to the command module in time to save Swigert in the command module—and without his assistance from inside, the LM could not have docked and locked into place. And *only* the command module has the heat shield that makes reentry to Earth possible.

Those factors are what I mean by saying the idea that "God helps those who help themselves," must apply; that the accident happened during the time the LM was available was not the result of forethought.

Everything from there on back home *was*.

Possibly God had something to do with the last-minute shift of Mattingly and Swigert, for that matter. It was a most improbable sort of chance that caused it—but it just so happened that Swigert's specialty, during his long training as an astronaut, had been thinking up and working out answers to "What if . . ." questions. "What if the service module somehow lost its oxygen . . ." and similar far-out possibilities.

As a result, there was probably no astronaut in the entire program better qualified to handle a wild variable such as the one they actually encountered; his specialty had forced him to learn all the alternative interconnections and jury-rigs possible to an Apollo spacecraft. He knew not only how it was supposed to work, but a lot of ways it could be made to work that it wasn't supposed to be able to.

Also it "just happened" that that particular astronaut crew had trained on the "What if . . ." of the service module oxygen (and consequent electric power) failure. They were the first team to try that "What if . . ."

The telemetry tapes will be studied, the photographs taken of the wounded service module after separation just above Earth, and the debriefing reports of the astronauts will be studied in detail to seek the cause of the catastrophe. Some conclusion will be reached, and something will be done.

The problems the men encountered, because the interconnections between LM power circuits and the command capsule power system didn't mesh properly, will be studied. Better heat-control systems will be worked out. But the basic problem will, of course, remain: When you're exploring a frontier, you don't know what will happen next.

If you did, it wouldn't be a frontier.

The spacecraft of today represent the highest technology Man's developed yet—but they're the equivalent of the wood, wire and canvas airplanes of the early



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Wright and Curtis experiments. The engines could just barely get the machines off the ground—and they stayed off more because of pilot skill than any degree of innate stability. They had no factor of safety to speak of, and a regrettable tendency to come apart in the air. And workable parachutes were yet to be invented.

Apollo spacecraft are just as marginal, in their realm, as those early planes were in theirs. Sure, they're the product of far higher engineering and technology—but they're going a very great deal higher, too, in a much less tractable medium than air.

They are frontier explorers—and the essence of every new frontier is the surprise of discovering a new way to get killed. The frontiersmen in our early West discovered surprises like poisonous springs, and rattlesnakes and the violent temper of grizzly bears, and how deceptive a desert can be. A lot of brand-new ways to die unexpectedly. A new frontier.

This recent world-record cliff-hanger will, naturally, rouse a lot of talk about rescue facilities.

As of this level of technology—forget it. We don't have Harry Harrison's "Daleth drive" to send a rescue submarine out to the Moon in a matter of a few hours.

In the case of Apollo 13, the astronauts were lucky enough to have a life-ship available—the LM with all its supplies intact was there, and because of that they were able to breathe during the eighty-some hours between accident and landing. They went a might short on drinking water, and very short on heat—but the LM (which was never designed for the massive overloads that it bore faultlessly!) saved them.

One of the reporters asked a flight director in Houston that Monday night which was the most critical factor; the oxygen, power and water were all known to be short. The NASA man replied "Seventy hours."

The problem was *time*. There was plenty of oxygen, power and water—for say twenty hours. The LM's lithium hydroxide canisters handled the carbon dioxide exhalations beautifully for the first twenty-four hours. (They'd been designed to handle *two* men during *part* of their stay on the Moon's surface; remember that part of the lunar excursion time would be Moon walks using the back-pack life-support systems.) But they were never intended for three men for some eighty hours.

It's that time feature that makes rescue—with present technology—hopeless. Men in a stable Earth-orbit—yes, that we might achieve. But Apollo 13 we couldn't hope to help.

Remember that as soon as the seriousness of the "We have a problem here . . ." was realized,



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the LM's descent stage engine was put to the job of pushing the whole stack of command module, service module, and LM into the "free return orbit" back to Earth.

That orbit involves a figure eight effect that loops around both the Earth and the Moon; it uses the Moon's gravitational well to reverse the velocity of the ship from outward-bound into a homeward-bound path. To have made that direction-reversal by using the engines would have been impossible—that great a change in velocity from something like +1.5 miles per second to −1.5 m.p.s. would have demanded far more fuel than they had available.

Once the ship was slung around the Moon—and that takes only about an hour—they were on their way home on about as fast an orbit as possible to them.

The heat shield on the command capsule is designed to survive the reentry into Earth's atmosphere at 25,000 miles an hour. It has the job of dissipating the energy of the 230,000-mile fall all the way from the Moon to Earth's atmosphere—and it's a marvel of technical ingenuity that achieves that.

But even it couldn't take a much greater reentry speed. A *faster* return from the Moon would necessarily mean hitting Earth's atmosphere with still greater energy—


KEEP PACE WITH SPACE AGE! SEE MOON SHOTS—LANDINGS, SPACE FLIGHTS, CLOSE-UP!

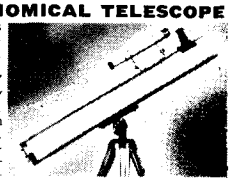
AMAZING SCIENCE BUYS for FUN, STUDY or PROFIT

**LONG-WAVE BLACK LIGHT FIXTURE**

Extremely versatile compactly designed, long wave (3200-4000 angstroms) black light (ultraviolet) fixture. Has 6-watt, 110-v lamp with built-in filter—eliminates harmful shorter wave ultraviolet rays. Use to identify minerals, fungi, bacteria—check for surface flaws, oil and gas leakage—perfect for displays. Mount vert., horz., or on corner.

Stock No. 70,364A ..... $12.50 Ppd.

**3" ASTRONOMICAL TELESCOPE**



See moon shots, orbits—stars, phases of Venus, planets close up, 60 to 180 power. Aluminized and overcoated 3" diameter f/10 primary mirror, ventilated cell. Equatorial mount with locks on both axes. Equipped with 60x eyepiece and mounted Barlow lens. 3x finder telescope, hardwood tripod. Included FREE: "STAR CHART"; 272-page "HANDBOOK OF HEAVENS".

Stock No. 85050A ..... $29.95 Ppd.
Stock No. 85,105A ..... 4¼" ..... $94.50 FOB
Stock No. 85,086A ..... 6" ..... $239.50 FOB

**GREAT INT'L PAPER PLANE BOOK**

Official fly-them-yourself book of paper airplanes from SCIENTIFIC AMERICAN'S "1st International Competition." Includes plans of all winning entries, time-aloft records. Has 20 unusual designs on perforated pages for easy tear-out. Amusing, entertaining. 128 pages 9" x 11¾".

Stock No. 9391A ..... $2.95 Ppd.

**MAIL COUPON FOR GIANT FREE CATALOG**

148 PAGES! MORE THAN 4,000 Unusual BARGAINS. Completely new Catalog. Packed with huge selection of telescopes, microscopes, binoculars, magnets, magnifiers, prisms, photo components, parts, kits, accessories.

EDMUND SCIENTIFIC CO.
300 Edscorp Building, Barrington, N. J.
Please rush Free Giant Catalog "A."

Name .....
Address .....
City ..... State ..... Zip .....

ORDER BY STOCK NUMBER • SEND CHECK OR MONEY ORDER • MONEY-BACK GUARANTEE

EDMUND SCIENTIFIC CO. 300 EDSCORP BUILDING BARRINGTON, NEW JERSEY 08007




LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

and greater heat would be involved.

There is simply no way present available technology could produce a return from the Moon in half the time.

But the same thing, necessarily, applies to a rescue ship starting out toward them. Remember that to achieve rescue, the crippled ship and the rescuer must meet with the *same velocity*. That's velocity, *not speed*. They have to be going in exactly the same direction, at exactly the same speed.

If a ship tried to roar out from Earth and meet the cripple on its limping way back from the Moon—the rescuer would be going about two miles a second outward while the cripple was falling homeward at two miles a second. If they met, there'd be metal vapor for a million miles around.

No, the rescuer would have to go roaring out, following the orbital arrangements established by the laws of celestial mechanics, and expend fuel braking its outward speed, reversing its velocity, and then reaccelerating till it overtook the now-Earthward-bound cripple, slow down again so as not to crash into the cripple, and finally pick up the shipwrecked astronauts.

Now the laws of celestial mechanics weren't made for our convenience, and they're really pretty tricky. If you're in an orbit around Earth exactly like that of ship B, following along exactly the same track around Earth, and you want to overtake B, the way you do it is to fire your retro-rocket and slow down your ship.

This causes your ship to drop out of the orbit B is in, into an orbit of smaller diameter, closer to the planet, which has a shorter period. (Earth satellites at the usual 200-mile or so elevation orbit in about ninety minutes. The synchronous satellites at roughly 23,000 miles take twenty-four hours. Smaller orbits are faster.) In your smaller orbit you soon overhaul B, and pass well ahead of it. Now you fire your engine to accelerate. This throws you out into a wider orbit—and as you sweep outward, of course you slow down. Presently you see B drifting up alongside you—and you can make rendezvous.

We won't bother going into the problems of changing orbital planes. A satellite in polar orbit might have an orbit of exactly the same period as one in equatorial orbit, but with the planes of the orbits 90° apart. They could get together over the equator, with both going at exactly the same speed—but with a catastrophic difference in velocity.

One way to remember the difference between speed and velocity is the sad comment a physicist friend of mine made. It seems he'd gotten a traffic ticket ($25) from a velocity cop, although he was going only fifteen miles per hour. It wasn't

*continued on page 176*



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

*Part III of IV.*

*Any effort to explore any frontier is always an invitation to a new and unexpected way of dying.*

*On a planet like Dhrawn, with a 40-gravity load, and a weirdly unstable atmo-hydrosphere, not even atomic-powered engines were an assurance of safety!*

HAL CLEMENT

*Illustrated by Kelly Freas*

LIGHT



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

*Dhrawn is the star/planet companion of Lalande 21185, a red dwarf sun half a dozen light-years from the solar system. It has been bothering the cosmologists and planetologists. In terms of mass, it is on the borderline between typical Jovian planet and extreme dwarf star; in terms of composition, it seems to be as nearly destitute of light elements as Earth, or Venus. It is generating internal energy; its sun could not warm it above a few tens of degrees Kelvin, but there are local regions as hot as 1200°K. The atmosphere contains free oxygen, although the oceans (?) contain not only water but ammonia—a chemically unstable situation leading to the presumption that Dhrawn has active life.*

*Direct exploration is impossible for human beings because of the forty-Earth surface gravity. It has been decided to hire natives of Mesklin, the variable-G planet of 61 Cygni A, to do the work. BARLENNAN, the Mesklinite sea captain who had worked with non-Mesklinite researchers on his own world fifty Earth years before, jumps at the offer—with unmentioned ideas of his own in connection with the deal. A Mesklin-conditioned settlement is established on Dhrawn, and a dozen exploring vehicles to be manned by the Mesklinites are designed and built.*

*One of these, the* Kwembly, *is commanded by DONDRAGMER, Barlennan's first officer in the old days when they were carrying alien instruments around their own planet. One of the* Kwembly's *helmsmen is a young sailor named BEETCHERMARLF.*

*The surface work is being monitored from a station manned principally by human beings, in synchronous orbit six million miles from the planet. Its chief administrator is ALAN AUCOIN, who has a basic, though fairly well hidden, distrust of nonhuman beings. His staff includes ELISE RICH HOFFMAN—"EASY"—who functions as interpreter with the Mesklinites, and general spreader of oil on troubled waters; and her husband IB HOFFMAN. Their seventeen-year-old son BENJ is also at the station, serving an apprenticeship in the aerology laboratory. Like his mother, Benj is an excellent natural linguist and can talk directly with the Mesklinites.*

*A distrust has been developing between human and Mesklinite leaders, partly because of Aucoin's attitude and partly from Barlennan's underhanded activities. Even though field communication between the settlement on Dhrawn and the land-cruisers has to be relayed through the human station, Barlennan has been working to establish another settlement independent of, and unknown to, the human beings. Toward this end he has arranged the "loss" of the land-cruiser* Esket *and the disappearance of her crew. The* Esket *is being*



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

*used as the nucleus of the new settlement, at which mining and other activities leading toward local self-sufficiency are being carried on.*

*Now, however, genuine troubles are developing. The complex phase relationships between water and ammonia have been outwitting the human aerologists and their computers, and Dondragmer's* Kwembly *has been washed down a river formed by a suddenly melting "snow" field, grounded, damaged, partly repaired, and finally frozen in. Beetchermarlf and a companion have been trapped under the cruiser by the ice; another officer, KERVENSER, has disappeared in one of the tiny scout helicopters carried by the* Kwembly.

*The human beings get into a sharp disagreement because of the* Kwembly *situation. Aucoin, as in the* Esket *incident previously, is reluctant to authorize a rescue trip by one of the other cruisers—though he realized that if Barlennan wants to do this there is no way to stop him. The elder Hoffmans want the whole decision left up to Barlennan, with any help whatever which he may ask—including rescue from space—to be furnished from the station. They resent Aucoin's policy of editing, or actually censoring, the reports between Dondragmer and Barlennan. Benj, who has formed a close radio friendship with Beetchermarlf, considers only the personal aspects of the problem, but is deeply upset by these. A staff discussion, kept from becoming a major brawl by Easy's professional tact, leads to only one result: Ib Hoffman, hearing for the first time a real summary of the relevant facts, begins to realize that Barlennan really is up to something on his own.*

*Beetchermarlf and his companion, caught in the shrinking volume of free liquid under the* Kwembly's *hull, spend hours in futile efforts to dig, scrape, and melt themselves free. They finally take refuge in one of the air cells forming the "mattress" underpinning between the hull and the driving trucks—incidentally concealing themselves very effectively from possible rescuers. Their own supply of breathing hydrogen, while not yet critically low, is causing them and the distant Benj more and more concern.*

*The human assistance to the* Kwembly *finally concentrates on technical advice, and some of the cruiser's equipment is dismantled to improvise a heater. Dondragmer is reluctant to take this step, fully aware of the Mesklinite position with regard to replacing or repairing, the equipment—but it seems the least of a host of evils.*

*At the Settlement, Barlennan and his staff have come to suspect that the human beings have not been entirely frank with their Mesklinite agents. Barlennan does not resent this, since he has been ex-*



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

*tremely deceitful himself and regards such things as matters of business acumen; but he decides that he should set up a test situation to find out how truthful the men are being, using the* Esket *as bait. He is about to send a message containing the arrangements by one of the dirigibles which the Mesklinites have improvised from homemade balloons and human-supplied power units. At this point, however, a message arrives from the orbiting station reporting a disturbance at the site where the* Esket *was lost. Barlennan is left wondering whether something is really happening at his secret base there, or whether the human beings are testing* him.

*At the* Kwembly, *Dondragmer is growing more and more concerned about the possibility of another flood, and keeps asking for risk estimates from the human scientists. If such a thing happens, his command is likely to be a total loss. He is considering moving the trapped vessel's life-support equipment to high ground, to insure his crew's survival. He also has his other helicopter out, carrying one of the television sets which transmit to the human station. The pilot is looking for Kervenser as well as for signs of another flood.*

*When the human watchers report that this set has also ceased sending, it does not occur to Dondragmer that the report might be false; but he is annoyed. He supposes that the pilot shuttered the set to keep the human beings from seeing something which would betray Barlennan's machinations, such as a wandering dirigible; and unlike most of the Mesklinite staff, he has never been in very close sympathy with Barlennan's policy of trickery.*

Part 3

## IX

The weather had long since cleared at the Settlement, the ammonia fog blown into the unknown central regions of Low Alpha and the wind dropped to a gentle breeze from the northwest. Stars twinkled violently, catching the attention of occasional Mesklinites who were outside or in the corridors, but going unnoticed for the most part by those in the better lighted rooms under the transparent roof.

Barlennan was in the laboratory area at the west side of the Settlement when Easy called, so her message did not reach him at once. It arrived in written form, borne by one of Guzmeen's messengers who, in accordance with standing orders, paid no attention to the fact that Barlennan was in conference. He thrust the note in front of his commander, who broke off his own words in mid-sentence to read it. Bendivence and Deeslenver, the scientists with whom he was speaking, waited in silence for him to finish,



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

though their body attitudes betrayed curiosity.

Barlennan read the message twice, seemed to be trying to recall something, and then turned to the messenger.

"All this just came in, I take it."

"Yes, sir."

"And how long has it been since the preceding report from Dondragmer?"

"Not long, sir—less than an hour, I'd say. The log would show; shall I check?"

"It's not that urgent, as long as you know. The last I heard was that the *Kwembly* had grounded after washing down a river for a couple of hours, and that was a long time ago. I assumed that everything was all right, since Guz didn't pass any more on to me about it. I assume now that he either heard interim reports at the usual intervals, or asked the humans about it?"

"I don't know, sir. I haven't been on duty the whole time. Shall I check?"

"No. I'll be there in a little while myself. Tell Guz not to send anything out after me; just hold any calls." The runner vanished, and Barlennan turned back to the scientists.

"Sometimes I wonder whether we shouldn't have more electrical communication in this place. I'd like to know how long it's taken Don to get into this mess, but I want to learn some other things before I walk all the way to Guzmeen's place."

Bendivence gestured the equivalent of a shrug. "We can do it if you say the word. There are telephones here in the lab which work fairly well, and we can wire the whole Settlement if you want the metal used that way."

"I don't yet. We'll keep to the original priorities. Here, read this. The *Kwembly* has gotten herself stuck in frozen water or something, and both her helicopters have disappeared. One had a communicator to the human beings aboard and in use at the time."

Deeslenver indicated his emotion with a soft buzz, and reached for the message in turn; Bendivence passed it over silently. The former read it silently—twice, as Barlennan had done—before he spoke.

"You'd think the humans would have a little more information if they were watching at all carefully. All this says is that Kervenser failed to come back from a flight, and that a flier searching for him with a communicator on board suddenly stopped sending—the screen just went blank all of a sudden."

"I can see one possible reason for that," remarked Bendivence.

"I thought you would," returned the commander. "The question is not what blanked the screen but why it should have happened there and then. We can assume that Ref-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

fel used the shutter on his set—it would have been nice if you'd thought of that trick before the *Esket* went out; it would have simplified that operation a lot—because something had come into his field of view which wouldn't have fit in with the *Esket* story. But what could it have been? The *Kwembly* is five or six million cables from the *Esket*. I suppose one of the dirigibles *could* be down that way, but why *should* it be?"

"We won't know until another flight gets back from Destigmet's place," replied the scientist practically. "What interests me is why we didn't hear about Kervenser's disappearance earlier. Why was there time for Reffel's mission to be flown and for him to disappear, too, before we were told about it? Was Dondragmer late in reporting to the human observers?"

"I doubt that very much," replied Barlennan. "Actually, they may have told us about Kervenser when it happened; remember, the runner said that other messages had been coming in. Guzmeen might not have thought the disappearance worth sending a runner for until Kerv had been gone for a while. We can check up on that in a few minutes, but I imagine there's nothing funny this time.

"On the other hand, I have been wondering lately whether the people up there have always been relaying information completely and promptly. Once or twice I've had the impression that—well, things were being saved up and sent in one package. It may be just sloppiness, or it may not really be happening—"

"Or they may be deliberately organizing what we hear," said Bendivence. "Half our crew could be lost at this point without our knowing it, if the human beings chose to play it that way. I can see their being afraid we'd quit the job and demand to be taken home, according to contract, if risks proved too high."

"I suppose that's possible," admitted Barlennan. "It hadn't occurred to me just that way. I don't think that particular notion is very likely, but the more I consider the situation, the more I'd like to think of a way of checking things—at least, to make sure they're not taking time to hold conferences on just how much to tell us every time something does go wrong with an exploring cruiser."

"Do you really think there's much likelihood of that?" asked Deeslenver.

"It's hard to tell. Certainly we've been a bit less than completely frank with them, and we have what we consider some very good reasons for it. I'm not really bothered either way. We know some of these people are good at business, and if we can't keep even with them it's our fault. All I really would like to be sure of is whether it's business or carelessness. I can think of one



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

way to check up, but I'd rather not use it yet; if anyone can suggest an alternative, it will be very welcome."

"What's the one you have?" both scientists asked together, Deeslenver perhaps half a syllable ahead.

"The *Esket*, of course. It's the only place where we can get an independent check on what they tell us. At least, I haven't thought of any other so far. Of course, even that would take a long time; there won't be another flight from there until sunrise, and that's twelve hundred hours or so away. Of course, we *could* send the *Deedee* even at night—"

"If we'd set up that light relay I suggested—" began Deeslenver.

"Too risky. It would have much too big a chance of being seen. We just don't know how good the human instruments are. I know most of them stay 'way up at that station overhead, but I don't know what they can see from it. The casual way they distribute these picture-senders for us to carry around here on this planet suggests that they don't regard them as very fancy equipment, as does the fact that they used them twelve years ago on Mesklin. There's just too much chance that they'd spot any light on the night side of this planet. That's why I overrode your idea, Dee; otherwise, I admit it was a very good one."

"Well, there's nothing like enough metal yet for electrical contact that far," added Bendivence. "And, I don't have any other ideas at the moment—though come to think of it, you might make a simple test on how well the humans can pick up lights."

"How?" the question came in body attitudes, not verbally.

"We could ask them innocently if there were any way of their hunting for the running lights or the floods of the missing fliers."

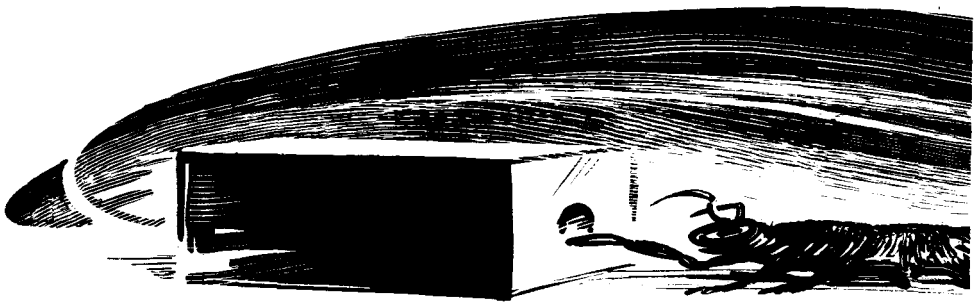
Barlennan pondered the suggestion briefly.

"Good. Excellent. Let's go—though if they say they can't, we won't be sure that they aren't just keeping it from us. You might be thinking of a further check for *that*." He led the way out of the map room where the discussion had been held, and along the corridors of the Settlement toward the communication room. Most of the passageways were relatively dark; the sponsors of the expedition had not stinted on the supply of artificial lights, but Barlennan himself had been rather close-nippered with their distribution. Rooms were adequately lighted; hallways had a bare minimum of illumination.

This gave the Mesklinites the comforting feeling that there was nothing overhead, by letting them see the stars without too much trouble. No native of that planet was really happy to face the fact that there was anything in a position to fall on him. Even the scientists glanced up occasionally as



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



they went, taking comfort from the sight even of stars not their own. Mesklin's sun, which men called 61 Cygni, was below the horizon at the moment.

Barlennan looked upward more than he looked ahead, but he was trying to get a glimpse of the human station. This carried a beacon light visible from Dhrawn as a fourth magnitude "star," and its barely visible crawl against the celestial background was the best long-term clock the Mesklinites had. They used it to reset the pendulum-type instruments which they had made, but which seldom agreed with each other for more than a few score hours at a time.

Stars and station alike faded from view as the trio entered the brightly lighted communication room. Guzmeen saw Barlennan and instantly reported, "No further news of either flier."

"What reports have you had from Dondragmer between the time the *Kwembly* ran aground and now—the last hundred and thirty hours or so? Do you know how long ago Don's first officer disappeared?"

"Only roughly, sir, to the last question. The incident was reported, but nothing specific was said about how recently it had happened. I took for granted it had just occurred, but didn't ask. The two disappearances were reported quite close together—less than an hour apart."

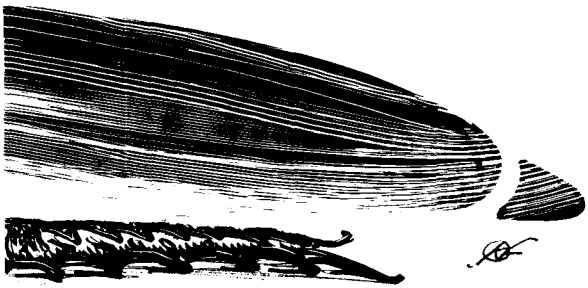
"And you didn't wonder when the second one came in why we heard about both disappearances so nearly simultaneously, even though they must have occurred some time apart?"

"Yes, sir. I started wondering about a quarter of an hour before you did, when the last message came in. I don't have any explanation, but I thought I'd leave it to you to ask the humans if you think one is needed."

Bendivence cut in. "Do you suppose Don failed to report the first



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



disappearance because it resulted from a mistake, and he hoped to be able to minimize it by reporting disappearance and recovery at the same time as a minor incident?"

Barlennan looked at the speaker speculatively, but lost no time in answering.

"No, I don't suppose that. Dondragmer and I don't always agree on everything, but there are some things that neither of us would do."

"Even if an immediate report couldn't really make a difference? After all, neither we nor the human beings could really help even after we'd heard the news."

"Even then."

"I don't see why."

"I do. Take my word for it; I haven't time for a detailed explanation, and I doubt that I could compose one anyway. If Dondragmer failed to make that initial report, he had a very good reason; and personally I doubt very much that the failure was his. Guz, which humans gave you the reports? Was it always the same one?"

"No, sir. I didn't recognize all their voices, and they often didn't bother to identify themselves. About half the time nowadays the reports come in human language. Most of the rest come from the Hoffman humans. There are others who speak our language, but those two seem the only ones who do it comfortably. With the young one particularly, I got the impression that he'd been talking a lot with the *Kwembly*, and I assumed that if there were casual chatter going on, nothing much serious could be happening."

"All right. I'd probably have done the same. I'll use the set; I have a couple of questions to put to the humans." Barlennan took his place in front of the pickup, the speaker on watch making way for him without being ordered. The screen was blank. The captain squeezed the "attention" control and waited patiently for the minute to pass. He could have started talk-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ing at once, since it was a safe bet that whoever was at the other end would lose no time readying his receiver, but Barlennan wanted to see who was there. If the delay made anyone suspicious, he'd have to live with it.

The face which did appear was unfamiliar to him. Even fifty Earth-years of acquaintance with human beings had not sufficed to educate him in such matters as family resemblance, though no human being would have failed to guess that Benj was Easy's son. Actually, the fifty years had not supplied many different people for comparison; fewer than two score men, and no women, had ever landed on Mesklin. Guzmeen recognized the boy, but was spared the need to tell Barlennan by Benj himself.

"Benj Hoffman here," the image spoke. "Nothing has come from the *Kwembly* since Mother called you about twenty minutes ago, and there are no engineers or scientists in this room at the moment. If you have questions which need technical answers, tell me so I can call the right one. If it's just a matter of detail in what's been happening, I've been here in the comm room most of the time for the last seven hours and can probably tell you. I'm waiting."

"I have two questions," Barlennan responded. "One of them you can probably answer, the other I don't know. The first has to do with the second disappearance. I am wondering how far from the *Kwembly* the second helicopter was when it ceased communicating; or if you don't know the distance, perhaps you can tell me how long its pilot had been searching.

"The second does depend on a bit of your technology which I don't know, but you may. Is there any possibility of your seeing lights such as those on the helicopters from where you are? I suppose it couldn't be done by your unaided eyes any more than it could be done by mine, but you have many optical devices which I know little about, and probably some which I've never heard of. I'm standing by."

Benj's screened image held up one finger and nodded just as Barlennan finished speaking, but the boy waited for the other question to reach him before he spoke.

"I can answer your first question, and Mr. Cavanaugh has gone to find someone who can take care of the second," were his opening words. "Kervenser started out on his scouting flight about eleven hours ago. It wasn't realized that he must be in trouble until about eight hours later, when everything popped at once—Kervenser and his flier gone, the *Kwembly* frozen in, and Beetchermarlf and Takoorch somewhere under the ice—at least, no one knows that's where they are but they were working under the



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

hull and there's no other place anyone can think of for them to be. One of the sailors—Reffel—took up the other flier with a vision set to look for Kervenser, and searched very close to the *Kwembly* for a while. Then we suggested that he move out to where an accident to Kervenser wouldn't have been seen or heard from the cruiser, which he did, and, of course, Dondragmer lost sight of him from the bridge. Then we got into a discussion with the captain and everyone up here got interested, and it turned out that no one was watching Reffel's screen for several minutes. Then someone noticed that the screen had gone completely blank—not no-signal-*blank* but no-light *black*—and that was that."

Barlennan glanced at Guzmeen and the scientists. None of them spoke, but none of them needed to. No one had been watching the screen when Reffel used the shutter! It was not the sort of luck one counted on.

Benj was still speaking.

"The sound wasn't on, of course, since no one had been talking with Reffel, and no one has any idea what happened. This was just before my mother called you, less than half an hour ago. That would make something like two and a half hours between the two disappearances. We'll have to wait for your other answer, since Mr. Cavanaugh isn't back yet."

Barlennan was a little bewildered by the arithmetic, since the boy had used Mesklinite number-words with human number-background, but got it straight with a few seconds of thought.

"I'm not complaining," he returned, "but I gather from what you say that over two hours passed between the *Kwembly's* freezing in and Kervenser's disappearance, and our being told about it. Do you know why that might have happened? I realize, of course, that there was nothing I could have done, but there was some understanding about keeping me up to date with the land-cruisers. Of course, I don't know just what your job is at the station, and you may not have that information; but I hear from my communications man that you have been talking a lot to the *Kwembly*, so you may be able to help. I'm waiting."

Barlennan had several motives behind his closing remark. One was obvious enough; he wanted to learn more about Benj Hoffman, especially since the latter was good with the Mesklinite language and, if Guz were right, seemed to want to talk to Mesklinites. Maybe he would be like the other Hoffman, a second sympathy-center in the station. If so, it would be important to know just how much weight he could swing.

Also, the commander wanted to check unobtrusively on Guzmeen's notion that Benj had been chat-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tering with *Kwembly* crew members. Finally, even Barlennan could tell that Benj was young for a human being doing serious work—his selection of words and general narrative style had been a giveaway. That fact might well be put to good use if a reasonably close relationship could be established.

The boy's answer, when it finally came, was inconclusive one way, but promising in another.

"I don't know why you weren't told about Kervenser and the freeze-up right away," he said. "Personally, I thought you had been. I'd been talking a lot with Beetchermarlf—I guess you know him; one of Don's helmsmen; the one you can talk with and not just listen to—and when I heard he'd disappeared I was concentrating on what could be done about it. I wasn't here in the comm room quite all the time; it's not my duty station—I just come when I can talk with Beetch. I admit someone should have told you sooner, and if you like I'll try to find out who should have and why he didn't. My mother ought to know, or Mr. Mersereau.

"I don't know how much explaining I'd better supply about the background to my job here. On Earth, when someone finishes basic education—the sort of thing everyone has to get, like reading and physics and sociology—he has to work as unskilled labor on some essential job for two to three of our years before he is eligible for either specialized or general higher education. Nobody says it right out, but everyone knows that the people you work for have the main say in what you can do afterward. Nominally I'm assigned to the aerology lab here as a sort of picker-upper and hey-you; actually anyone in the station who yells first and loudest gets me. I must admit they don't make my life very hard. I've been able to spend a lot of time talking to Beetch the last few days."

Barlennan was able with fifty years experience to translate without effort the thought behind a human being's use of the word *day*.

"Of course," the boy went on, "knowing your language helps. My mother's a language nut, and I picked it up from her. She started on yours ten years ago when Dad was first connected with the Dhrawn project. I'll probably be doing comm work semiofficially a good deal of the time from now on. Here comes Mr. Cavanaugh with one of the astronomers whose name I think is Tebbets. They'll answer your question about seeing lights, and I'll try to find out about the other business."

Benj's face was replaced on the screen by that of the astronomer—a set of broad, dark features which rather surprised Barlennan. He had never, as it happened, seen a bearded human being, though he



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

was used to wide variations in cranial hair. Tebbetts' was a small Vandyke adornment quite compatible with a space helmet, but it made a drastic difference to the Mesklinite's eye. Barlennan decided that asking the astronomer about it would be tactless; it might be better to get the information from Benj later. There was nothing to be gained by embarrassing anyone.

The facial extension, to the commander's relief, did not interfere with its owner's diction, and Tebbetts had evidently been given the question already. He started to talk at once, using the human speech.

"We can detect from here any of the artificial lights you have, including the portables, though we might have trouble with beamed ones not pointed our way. We'd use regular equipment—photomultiplier mosaics behind appropriate objective; anything you're likely to need could be set up in a few minutes. What do you want us to do?"

This question caught Barlennan by surprise. He had, in the few minutes since discussing the matter with his scientists, been growing more and more certain that the men would deny being able to detect such lights. Certainly if the commander had been a little more foresighted he would not have answered as he did—in fact, he was regretting what he said well before the words reached the station.

"You should have no trouble spotting our land-cruiser *Kwembly*; you already know its location better than I do, and its bridge lights would be on. Its two helicopters have just disappeared, and they normally carry lights. I'd like to have you scan the area within, say, two hundred miles of the *Kwembly* as carefully as you can for other lights, and tell both me and Dondragmer the positions of any you find. Would that take long?"

The message lag was quite long enough to let Barlennan realize how he had slipped. There was nothing to be done about it now, of course, but to hope, though that word is a bad translation of the nearest possible Mesklinite attitude. The answer did cause him to brighten up a little; maybe the slip wasn't too serious—as long as the human beings didn't find more than two other lights near the *Kwembly!*

"I'm afraid I was thinking merely of detecting lights," said Tebbetts. "Pinpointing the sources will be harder, especially from here. I'm pretty sure we can solve your problem, though . . . that is, if your missing helis are shining their lights. If you think they may have crashed, I shouldn't think there'd be much chance of light, but I'll get right to it."

"How about their power plants?" asked Barlennan, determined to learn the worst now that he had started. "Aren't there other radi-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ations than light given off in nuclear reactions?"

By the time this question reached the station Tebbets had left according to his promise, but fortunately Benj was able to supply the answer—the information happened to be basic to the Project, which had been carefully explained to him right after his arrival.

"The fusion converters give off neutrinos which we can detect, but we can't spot their source exactly," he told the commander. "That's what the shadow satellites are for. They detect neutrinos, which are practically all coming from the sun. The power plants on Dhrawn and up here don't count for much against that, even if it isn't much of a sun. The computers keep track of where the satellites are, and especially whether the planet is between a given one and the sun, so there's a measure of the neutrino absorption through different parts of the planet. In a few years we hope to have a statistical X ray of Dhrawn—maybe that isn't a good analogy for you. I mean a good idea of the density and composition of the planet's insides. They're still arguing, you know, whether Dhrawn should be called a planet or a star, and whether the extra heat is from hydrogen fusion in the middle or radioactivity near the surface.

"But I'm sure as can be that they couldn't find your missing fliers from their neutrino emission, even if all their converters are still on."

Barlennan managed to conceal his glee at this news, and merely answered, "Thanks. We can't have everything. I take it you'll tell me when your astronomer finds anything, or when he is sure he'll find nothing; I'd like to know if I have to stop counting on that. I'm through talking for now, Benj, but call here if anything comes up on either the fliers or those friends of yours—after all, I'm concerned about them, though perhaps not the way you are about Beetchermarlf. Takoorch is the one I remember."

Barlennan, with more direct contact with human beings and, to be honest, more selfish reasons to develop such skills, had been able to read more accurately between the lines of Benj's talk and obtain a more nearly correct picture of the boy's feelings than Dondragmer had. It would, he was sure, be useful; but he put it from his mind as he turned away from the communicator.

"That could be both better and worse," he remarked to the two scientists. "It's certainly just as well we didn't set up that blinker system for night communication; they'd have seen us certainly."

"Not certainly," objected Deeslenver. "The human said they *could* spot such lights, but there was no suggestion that they made a habit of looking for them. If it



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

takes instruments, I'd bet the instruments are busy on more important things."

"So would I, if the stakes weren't so high," returned Barlennan. "Anyway, we wouldn't dare use it now, because we know they'll be looking this way with the best machines they have. We just asked them to."

"But they won't be looking here. They'll be searching the neighborhood of the *Kwembly*, millions of cables from here."

"Think of yourself back home looking up at Toorey. If you were supposed to examine one part of it closely with a telescope, how much of a slip would it take to make you glance at another?"

Deeslenver conceded the point with a gesture.

"Then we either wait for sunrise, or fly a special if we want to use the *Esket* as you suggested. I admit I haven't thought of anything else. I haven't even thought of what we might do there which would make a good test."

"It shouldn't matter too much. The real question would be how soon, and how accurately and completely, the human beings do report whatever we set up for them to see. I'll think of something in the next couple of hours. Aren't you researchers setting up for a flight to leave soon, anyway?"

"Not that soon," said Bendivence. "Also, I don't agree with you that details don't matter. You don't want them to get the idea that *we* could possibly have anything to do with what they see happen at the *Esket*, and they certainly aren't stupid."

"Of course. I didn't mean that they should. It will be something natural, making full allowance for the fact that the human beings know even less than we do about what's natural on this world. You get back to the labs and tell everyone who has equipment to get onto the *Deedee* that departure time has been moved ahead. I'll have a written message for Destigmet in two hours."

"All right." The scientists vanished through the door, and Barlennan followed them more slowly. He was just beginning to realize how valid Bendivence's point was. What could be made to happen, in range of one of the *Esket's* vision transmitters, which would not suggest that there were Mesklinites in the neighborhood, but which would attract human interest—*and* tempt the big creatures to edit their reports? Could he think of such a thing without knowing why the reports were being held up? Or, for that matter, without being quite sure that they were?

It was still possible that the delay on the *Kwembly* matter had been a genuine oversight; as the young human had suggested, each person might have thought that someone else had attended to the matter. To



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Barlennan's sailor's viewpoint this smacked of gross incompetence and inexcusable disorganization; but it would not be the first time he had suspected human beings—not as a species, of course, but on an individual basis—of these qualities.

The test certainly had to be made, and the *Esket*'s transmitters must surely be possible tools for the purpose. As far as Barlennan knew, these were still active. Naturally, care had been taken that no one enter their field of view since the "loss" of the cruiser, and it had been long since any human being had made mention of them. They would have been shuttered rather than avoided, since this obviously left the Mesklinites at the place much greater freedom of action; but the idea of the shutters had not occurred until after Destigmet had departed with his instructions to set up a second Settlement unknown to the human beings.

As Barlennan remembered, one of the transmitters had been at the usual spot on the bridge, one in the laboratory, one in the hangar where the helicopters were kept—these had been carefully arranged to be out on routine flights when the "catastrophe" occurred—and the fourth in the life-support section, though not covering the entrance. It had been necessary to take much of the equipment from this chamber, of course.

With all the planning, the situation was still inconvenient; having the lab and life rooms out of bounds, or at best possible to visit with only the greatest care, had caused Destigmet and his first officer, Kabremm, much annoyance. They had more than once requested permission to shutter the sets, since the technique had been invented. Barlennan had refused, not wanting to call human attention back to the *Esket*; but now—well, maybe the same net could take two fish. The sudden blanking of one, or perhaps all four, of those screens would certainly be noticed from above. Whether the humans would feel any inclination to hide the event from the Settlement there was no way of telling; one could only try.

The more he thought it over, the better the plan sounded. Barlennan felt the glow familiar to every intelligent being, regardless of species, who has solved a major problem unassisted. He enjoyed it for fully half a minute. At the end of that time, another of Guzmeen's runners caught up with him.

"Commander!" The messenger fell into step beside him in the nearly dark corridor. "Guzmeen says that you should come back to Communications at once. One of the human beings—the one called Mersereau—is on the screen. Guz says he ought to be excited, but isn't, because he's reporting something going on at the *Esket*—something is moving in the laboratory!"



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

## X

Keeping in phase with Barlennan as he switched directions took some doing, but the messenger managed it. The commander took his continued presence for granted.

"Any further details? When, or what was moving?"

"None, sir. The man simply appeared on the screen without any warning. He said, 'Something is happening at the *Esket*. Tell the commander.' Guzmeen ordered me to bring you back on hurricane priority, so I didn't hear any more."

"Those were his exact words? He used our language?"

"No, it was the human speech. His words were—" the runner repeated the phrase, this time in the original tongue. Barlennan could read no more into the words than had been implicit in the translation.

"Then we don't know whether someone slipped up and was seen, or dropped something into the field of the lens, or—"

"I doubt the first, sir. The human could hardly have failed to recognize a person."

"I suppose not. Well, some sort of detail should be in by the time we get back there."

There wasn't, however. Boyd Mersereau was not even on the screen by the time Barlennan reached Communications. More surprising, neither was anyone else. The commander looked at Guzmeen suspiciously; the communication officer gave the equivalent of a shrug. "He just went, sir, after that one sentence about the lab."

Barlennan, mystified, squeezed the "attention" control.

But Boyd Mersereau had other things on his mind. Most, but not quite all, were concerned with events on Dhrawn, but not with the *Esket;* and there were a few matters much closer than the giant star-planet.

The chief of these was the cooling down of Aucoin. The planner was annoyed at not having been brought into the exchanges between Dondragmer and Katini, and the captain and Tebbetts. He was inclined to blame young Hoffman for going ahead with policy-disturbing matters without official approval. However, he did not want to say anything which would annoy Easy; he regarded her, with some justification, as the most nearly indispensable member of the communications group. In consequence, Mersereau and others received some fallout from the administrator's deflected ire.

This was not too serious, as far as Boyd was concerned. He had years before pigeonholed the pacifying of administrators along with shaving—something which took up time but did not demand full attention, and worth doing at all only because it was usually less trouble in the long run. The real attention-getter, the thing which kept even news from the *Esket* in



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the background, was the state of affairs at the Kwembly...

By himself he might have been moderately concerned, but only moderately. The missing Mesklinites weren't close personal friends of his. He was civilized enough not to be any less bothered by their loss than if they had been human, but it was not as though they were his brothers or sons.

The *Kwembly* herself was a problem, but a fairly routine one. Land-cruisers had been in trouble before, and so far had always been extricated sooner or later. So, all in all, Mersereau would have been merely absorbed, not bothered, if left to himself.

He was not left to himself. Benj Hoffman felt much more strongly about the whole matter, and had a way of making his feelings clear. This wasn't entirely by talking, though he was perfectly willing to talk. Even when silent he empathized. Boyd would find himself discussing with Dondragmer the progress of the melting-out plan, or the chances of another flood in terms of their effect on the missing helmsmen, rather than with reasonable and proper professional detachment. It was annoying. Beetchermarlf and Takoorch, and even Kervenser, just weren't that central to the work, and the real question was the survival of the crew. Benj, sitting silently beside him, or, at most, interjecting a few remarks or questions, somehow managed to make objectivity seem like callousness; and Mersereau, who had never raised any children of his own, had no defense against that particular treatment. Easy knew perfectly well what was going on, but she did not interfere because she shared almost perfectly her son's feelings. Partly because of her sex and partly because of her own background she felt a very intense sympathy for Beetchermarlf and his companion, and even for Takoorch. She had been caught in a rather similar situation some twenty-five years before, when a concatenation of errors had stranded her in an unmanned research vessel on a high-temperature, high-pressure planet.

In fact, she went to greater lengths than Benj had dared. Dondragmer might—probably would—have sent out a ground party to the site of Reffel's disappearance, since the location was fairly well known; but it was unlikely that he would have risked sending one of his three remaining communicators along. Easy, partly by straightforward argument in her own name and partly by using her son's techniques to swing Mersereau to the same side, convinced the captain that the risk of *not* taking the equipment along would be even greater. This discussion, like so many of the others, was conducted in Aucoin's absence, and, even as he argued with Dondragmer, Mer-



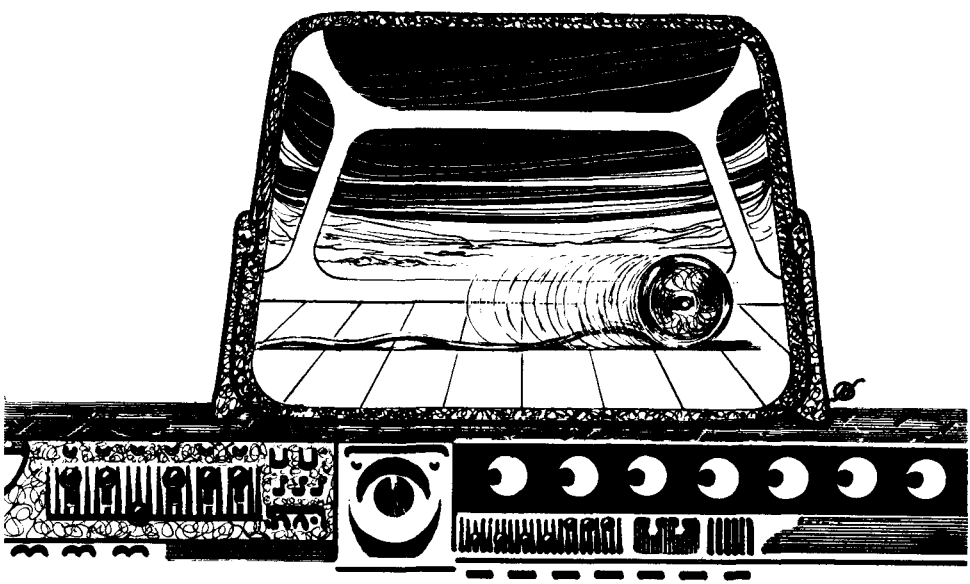
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sereau was wondering how he would justify this one to the planner. Nevertheless, he argued on Easy's side, with Benj almost grinning in the background.

With this claim on his attention, Boyd scarcely noticed the call from another observer that a couple of objects were moving across the screen which showed the *Esket*'s laboratory. He switched channels briefly and passed the word on to the Settlement, cutting back to the *Kwembly* without waiting for the end of the communication cycle. Later he claimed that he had never been really conscious of the *Esket*'s name in the report; he had thought of the message as a routine report from some observer or other, and his principal feeling had been one of irritation at being distracted. Some people would have snapped at the observer; Boyd, being the person he was, had taken what seemed to him the quickest and simplest way of disposing of the interruption. He had then quite genuinely forgotten the incident.

Benj had paid even less attention. The *Esket* incident had occurred long before his arrival at the station, and the name meant nothing in particular to him, although his mother had once mentioned her friends Destigmet and Kabremm to him.

It was Easy, of course, who had really reacted to the call. She scarcely noticed what Mersereau





LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

did or said, and never thought of telling Barlennan herself until more details came in. She moved immediately to a chair commanding a view of the "lost" cruiser's screens and relegated the rest of the universe to background status.

Barlennan's return call, therefore, brought him very little information. Easy, to whom it was passed, had seen nothing herself; by the time she had reached her new station all motion had ceased. The original observer was only able to say that he had seen two objects, a reel of cable, or rope, and a short length of pipe, roll across the *Esket*'s laboratory floor. It was possible that something might have pushed them, though there had been no sign of life around the vehicle for several terrestrial months; it was equally possible, and perhaps more probable, that something had tilted the *Esket* to start them rolling. So said the observer, though he could not suggest specifically what might have tipped the monstrous machine.

This left Barlennan in a quandary. It was possible that one of Destigmet's crew had become careless. It was possible that natural causes might be operating, as the humans seemed to prefer to believe. It was also possible, considering what Barlennan himself had just been planning to do, that the whole thing was a piece of human fiction. The commander's conscience made him attach rather more weight to this possibility than he might have done in other circumstances.

It was hard to see just what they could expect to accomplish by such a fiction, of course. It could hardly be a trap of any sort; there could be no wrong reaction to the story. Complete mystification was the only possible response. If there were something deeper and more subtle involved, Barlennan had to admit to himself that he couldn't guess what it was.

And he didn't like guessing anyway. It was so much easier to be able to take reports at face value, allowing only for the capabilities of the speaker and not worrying about his possible motives. At times, the commander reflected, the annoying straightforwardness of Dondragmer which made him disapprove of the whole *Esket* trick had something to be said for it.

Really, all one could do was assume that the report was a truthful one; that should, at least, cause anything underhanded on the human side to backfire on its planners. In that case, there was nothing to do except check with Destigmet. That was simply another message to send on the *Deedee*.

Come to think of it, this was another potential check on the accuracy of the human reports. Certainly this one, whatever else could be said for or against it, showed



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

signs of having come through quickly. Of course, Mrs. Hoffman was involved this time.

The thought that Easy's involvement made the situation a special one was probably the only idea Barlennan and Aucoin would have had in common just then. Of course, the latter hadn't heard anything about the new *Esket* incident so far, and even Mersereau hadn't really thought about it. He was still otherwise engaged.

"Easy!" Boyd turned from his microphone and called across to her new station. "We seem to have convinced Don. He's sending a vision set with his six-man search party. He wants to check his own estimate of the distance to where Reffel vanished, and assumes that we can pinpoint where his transmitter was. I know we could have at the time, but I'm not sure that would have been recorded. Do you want to take over here while I check up with the mappers, or would you rather go yourself?"

"I want to watch here a little longer. Benj can go up, if he can stand leaving the screens for a minute." She looked only half-questioningly at the boy, and he nodded and disappeared at once. He was gone rather longer than expected, and returned with a somewhat crestfallen appearance.

"They said they'd gladly give me the map made from the first part of Reffel's flight, before I had told him to go on out to where he could barely see the *Kwembly*. All they could say about where he disappeared was that it must be off that map, which covers the width of the valley for about a mile westward of the cruiser."

Mersereau grunted in annoyance. "I'd forgotten about that." He turned back to his microphone to relay this not very helpful information to Dondragmer.

The captain was neither particularly surprised nor greatly disturbed. He had already discussed his own estimate of the distance and direction involved with Stakendee, who was leading the search party.

"I suppose the human beings were right about having you take the set along," the captain had remarked. "It will be a nuisance to carry and I don't much like risking its loss, but having it will cut down the risk of losing you. I'm still concerned about a repetition of the flood that brought us here, and the people up above can't give us any definite prediction—though they seem to agree that there should indeed be a flood season coming. With the set, they'll be able to warn you if they get any definite information, and you'll be able to tell me, through them, if you do find anything."

"I'm not sure in my own mind what's best to do if a flood does come," said Stakendee. "Of course if we're close to the *Kwembly* we'll



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

do our best to get back aboard, and I suppose if we're really distant we'd make for the north side of the valley, which seems to be nearer. In a borderline case, though, I'm not sure which would be best; surviving the flood would do us little good if the ship got washed a year's walk farther downstream."

"I've been thinking about that, too," replied the captain, "and I still don't have an answer. If we're washed away again there's the very large chance the ship will be ruined. I can't decide whether we should take time to get life-support equipment out and set up on the valley side even before we go on with trying to melt her out. Your own point is a good one, and maybe I should have it there for your sake as well as ours. Well, I'll solve it. Get on your way. The sooner this is done, the less we'll have to worry about floods."

Stakendee gestured agreement, and five minutes later Dondragmer saw him and his group emerge from the main lock. The communicator gave the party a grotesque appearance; the block of plastic, four inches high and wide and twelve in length, was being carried litter fashion by two of the searchers. The three-foot poles were only two inches apart, supported on yokes at the mid-point of the eighteen-inch-long bodies of the bearers. The poles and yokes had been fashioned from ship's stores; the Mesklinite equivalent of lumber, of which literally tons filled some of the store compartments, formed another of the incongruities which the nuclear-powered cruiser offered in such profusion.

The search party rounded the bow of the *Kwembly*, which was facing northwest, and proceeded straight west. Dondragmer watched its lights for a few minutes as they wound around and over the boulders, but had to turn to other matters long before they were out of sight.

Elongated figures were swarming over the hull working the radiator bar loose. Dondragmer had not liked to give the order for such destructive activity; but he had weighed as best he could the relative risks of doing it or of leaving it undone, and after reaching a decision he was not sufficiently human to keep on worrying whether or not it had been a good one. Just as most human beings thought of Drommians as typically paranoid, most Mesklinites who knew them at all thought of human beings as typically vacillating. Dondragmer, the decision made and the order given, simply watched to make sure that a minimum of damage was done to the hull. From the bridge he was unable to see over its curve to the point, far astern, where the conductors came through; he would have to go outside a little later to oversee that part of the work. Maybe it would be even bet-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ter to take a vision set outside and let the human engineers supervise it. Of course, with the communication delay it would be difficult for them to stop a serious error in time.

For the moment, though, the job could be left in Praffen's nippers. The problem the captain had mentioned to Stakendee needed more thought. The life-support equipment was easy to dismount, and he could spare the men to transport it without cutting into the ice-removal project too badly; but, if a flood came while it was ashore and carried the Kwembly a long distance, things might become awkward. The system was a closed-cycle one using Mesklinite plants, depending on the fusion converters for its prime energy. By its nature, it had just about the right amount of vegetation to take care of the crew—had there been much more, there would not have been enough Mesklinites to take care of the plants. It might be possible to carry part of it away and leave the rest, and expand each half to take care of the whole crew whenever circumstances forced the decision between ship and shore; it would be easy enough to make more tanks, but growing either culture up to a population sufficient to supply hydrogen for the whole crew might be a little tense on time.

In a way it was too bad that all the communication went through the human station. One of the major and primary tasks of the *Esket* crew was to modify the old system, or to produce a new one, with much more flexibility in the number of people it could take care of; and for all Dondragmer knew, this end might have been accomplished months ago.

His musings were interrupted by the communicator.

"Captain! Benj Hoffman here. Would it be too much trouble to set up one of the viewers so that we could watch your men work on the melting project? Maybe the one on the bridge would do if you just slid it out to starboard and faced it aft."

"That will be easy enough," replied the captain. "I was thinking perhaps it would be well for some of you people to watch the work."

Since the set weighed less than five hundred pounds in Dhrawn's gravity, it was only its rather awkward dimensions which gave him trouble; he faced about the same problem as a man trying to move an empty refrigerator carton. By pushing it along the deck, rather than trying to pick it up, he worked it into a good position in a few seconds. In due course, the boy's acknowledgment came back.

"Thanks, Captain; that's good. I can see the ground along the starboard side, and what I suppose is the main lock, and some of your people working along the sides. It's a little hard to judge distances, but I know how big the *Kwembly* is



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

and about how far back the main lock is, and, of course, I know how big your people are, so I'd guess your lights let me see the ice for fifty or sixty yards on past the lock."

Dondragmer was surprised. "I can see fully three times that far—no, wait; you're using your twelve-based numbers so it's not that much—but I do see farther. Eyes must be better than the pickup cells in your set. I hope, though, that you are not just watching what goes on here. Are the other screens for the *Kwembly* sets all where you can see them? Or are there other people watching them? I want to be kept in as close touch as I possibly can with the search party that has just left on foot. After what happened to Reffel, I'm uneasy about both them and their set."

Dondragmer was debating with his own conscience as he sent this message. On the one hand, he was pretty certain that Reffel had shuttered his set deliberately, though it was even less clear to him than to Barlennan why this should have been necessary. On the other was his disapproval of the secrecy of the whole *Esket* maneuver. He would not, of course, deliberately ruin Barlennan's plans by any act of his own; but he would not be too disappointed if everything came out in the open. There certainly was a reasonable chance that Reffel was in real trouble; if, as seemed likely, whatever had happened to him had occurred only a few miles away, he had had time to get back and explain even on foot.

In other words, Dondragmer had a good excuse, but disliked the thought that he even needed one. After all, there was Kervenser, too.

"All four screens are right in front of me," Benj's assurance came back. "Just now I'm alone at this station, though there are other people in the room. Mother is about ten feet away, at the *Esket*'s screens—did anyone tell you that something had moved on one of those?—and Mr. Mersereau has just gone off for another argument with Dr. Aucoin." (Barlennan would have given a great deal to hear that sentence.) "There are about ten other observers in the room watching the other sets, but I don't know any of them very well. Reffel's screen is still blank, five people are working in whatever room in the *Kwembly* your other set is in but I can't tell just what they're doing, and your foot party is just walking along. I can see only a few feet from them, and only in one direction, of course. The lights they're carrying aren't nearly as strong as the ones around the *Kwembly*. If anything does come after them, or some trouble develops, I may not even get as much warning as they do; and, of course, there'll be the delay before I could tell them anyway."

"Will you remind them of that?" asked Dondragmer. "The leader is



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

named Stakendee. He doesn't have enough of the human language to do any good. He may very well be depending too heavily on you and your equipment for warning; I'm afraid I took for granted, without saying much of anything about it, that your set would help him that way when we were planning the search. Please tell him that it is strictly an indirect communicator between him and me."

The boy's response was considerably longer in coming than light-lag alone would explain; presumably he was carrying out the request without bothering to acknowledge its receipt. The captain decided not to make a point of the matter: Hoffman was very young. There was plenty else to keep Dondragmer busy, and he occupied himself with this, filing the unfinished conversation until Benj's voice once more reached the bridge.

"I've been in touch with Stak and told him what you asked. He promised to take care, but he's not very far from the *Kwembly* yet—still among the stones, and they give out a little way upstream, you remember. He's still on the map, I think, though I can't really tell one square yard of that rock garden from another. It's either smooth ice, or ice with cobblestones sticking up through it, or occasionally cobblestones with no ice between them. I don't see how they're going to search it very effectively. Even if you climb on the highest rock in the neighborhood, there are a lot of others you can't see behind. The helicopters aren't very big, and you Mesklinites are a lot smaller."

"We realized that when we sent out the party," Dondragmer answered. "A really effective search will be nearly impossible among the stones if the missing people are dead or even helpless. However, as you said, the stones give way to bare rock a short distance from here; and in any case, it is possible that Kerv or Reffel could answer calls, or call for help themselves. Certainly one can be heard much farther than he can be seen, at night. Also, whatever is responsible for their disappearance may be bigger or easier to spot." The captain had a pretty good idea how Benj would answer the last sentence. He was right.

"Finding whatever that is by having another group disappear wouldn't put us much farther ahead."

"It would if we actually learned what had happened. Keep in close touch with Stakendee's party, please, Benj. My own time is going to be taken up with other matters, and you'll learn whatever happens half a minute before I could anyway. I don't know that those seconds will make much real difference, but at least you're closer to Stak in time than I am.

"Also, I have to go outside now.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

We're getting to a ticklish point in taking this metal bar off the hull. I'd bring one of the sets outside to keep in closer touch with you, but I wouldn't be able to hear you very well through a suit. The volume of these communicators of yours isn't very impressive. I'll give you a call when I'm back in touch; there's no one handy to leave on watch here. In the meantime please keep a running log, in any way you find convenient, on what happens to Stakendee."

The captain waited just long enough to receive Benj's acknowledgment—which did arrive this time—before making his way down to the lock and donning his airsuit. Preferring an inside climb to an outside one, he took the ramps back to the bridge and made use of the small lock which gave onto the top of the hull—a U-shaped pipe of liquid ammonia just about large enough for a Mesklinite body. Dondragmer unsealed and lifted the inner lid and entered the three-gallon pool of liquid, the cover closing by its own weight above him. He followed the curve down and up again and emerged through a similar lid outside the bridge.

With the smooth plastic of the hull curving down on all sides, except aft, he felt a little tense, of course; but he had long ago learned to control himself even in high places. His nippers flashed from one holdfast to another as he made his way aft to the point where the few remaining refrigerator attachments were still intact. Two of these were the ones which extended entirely through the hull as electrical contacts, and were, therefore, the ones which caused Dondragmer the most concern. The others, as he had hoped, were prying out of the cruiser's skin like nails; but these last ones would have to be severed, and severed so that they could be reconnected later on. Welding and soldering were arts which Dondragmer knew only in theory, but whatever substitute was to be used would certainly need a stub projecting from the hull as a starting point. The captain wanted to make particularly sure that the cutting was done far enough out to leave one.

The cutting itself, as he had already been told, would be no trouble with Mesklinite saws. He selected carefully the points where the cuts were to be made, and saw two of his sailors started on this task; he warned the rest to get out of the way when the bar was free. This meant not only down to the surface but well away from the hull; the idea was to lower the metal on the lock side, once it was detached, but Dondragmer was a cautious being where weights were concerned and knew that the bar might just possibly not wait to be lowered. Even a Mesklinite would regret being underneath when it descended from the top of the hull,



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

feeble as Dhrawn's gravity seemed to them.

All this had taken the best part of an hour. The captain was wondering about the progress of the foot party, but there was another part of the melting project to check first. He reentered the ship and sought the laboratory, where Borndender was readying a power unit to fit the makeshift resistor. Actually there was little to be done: polarized sockets, one at one end of the block and one at the other, would provide direct current if the bar could be gotten into the holes, and any changes needed to make a fit possible would have to be made on the bar rather than the power box. It took only a moment to make this clear to the captain, who looked for himself, decided the scientist was obviously right, and made his way hastily back to the bridge. Only when he got there and tried to call Benj did he realize that he had never removed his airsuit; talking to Borndender through it was one thing, but the radio was quite another. He stripped it off far enough to get his speaking-siphon into the open and spoke again.

"I'm back, Benj. Has anything happened to Stakendee?" He finished removing the suit while waiting for the answer, smoothed it, and stowed it close to the center hatchway. It didn't belong there, but there wouldn't be time to get it down to the rack by the main lock and return before Benj's words.

"Nothing really important, as far as I can tell, Captain," came the boy's voice. "They've walked a long way, though I can't tell just how far—maybe three miles since you went, but that's a guess. There has been no sign of either flier, and the only thing they, or I, have seen which might possibly have affected either of them has been an occasional patch of cloud a few hundred feet up—at least, that's what Stak guesses; I can't see well enough myself—drifting back toward the *Kwembly*. I suppose if you accidentally flew into a big cloud you might get disoriented and if it was low enough crash before you could straighten out; there aren't any blind flying instruments on those things, are there? But it's hard to believe they'd do such a thing—of course, if they were keeping their eyes on the ground instead of their flying—but none of the clouds we've seen so far is anywhere near big enough to give them time to lose their way, Stak says."

Dondragmer was inclined to share this doubt about clouds being responsible—would have doubted it even had he not had reason for another opinion. An upward glance showed that no clouds had yet reached the *Kwembly*; the stars twinkled everywhere. Since Benj had said they were coming toward the cruiser, the ones Stakendee had seen must be at the edge of the pattern, and they must have been



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

much farther to the west when the fliers were up. This might mean nothing as far as Kervenser was concerned—he could have been a long, long way from the *Kwembly*—but suggested that Reffel at least had not encountered them. He brought his attention back to Benj, who had not paused for a reply.

"Stak says the stream bed is going uphill noticeably, but he didn't tell me how he knew—just that they'd gone up several feet since leaving the *Kwembly*." Pressure change, Dondragmer assumed; it was always more noticeable in the suits. Just climbing around on the hull made a difference in suit tightness which could be felt. Besides, the stream which had carried the cruiser here had been flowing fairly fast; even allowing for Dhrawn's gravity, its fall must be fairly great. "The only other real change is the nature of the bottom. They're well away from the cobbles. It's mostly bare rock, with patches of ice in the hollows."

"Good. Thank you, Benj. Have your weathermen come up with anything at all about the likelihood of another flood?"

The boy chuckled, though the sound meant little to the Mesklinite. "Nothing, I'm afraid. Dr. McDevitt just can't be sure. Dr. Aucoin was complaining about it a little while ago, and my boss just cut loose. He said that it had taken men a couple of centuries to get where they could make a reliable ten-day forecast on Earth, with only one phase-varying component—water—and the whole planet accessible for measurement. Anyone who expected much in a couple of years for a world as big as Dhrawn which had been covered to the extent of about one back yard and had two phase-variables and a temperature range from fifty to over a thousand degrees Kelvin must still believe in magic. He said we were lucky the weather hadn't produced ice fields that turned into swamps when the temperature dropped and rainstorms six feet deep with clear air underneath but icing up the cruiser bridges and forty other things that his computer keeps coming up with every time he changes another variable. It was funny watching Dr. Aucoin try to calm him down. Usually it's the other way around."

"I'm sorry I wasn't there to hear it. You seem amused," replied the captain. "Did you tell your chief about the clouds which Stakendee has reported?"

"Oh, certainly. I told everyone. That was only a few minutes ago, though, and they haven't come back with anything yet. I really wouldn't expect them to, Captain; there just isn't enough detailed information from the surface for interpolation, let alone prognosis. There *was* one thing though; Dr. McDevitt was very interested in finding out how many feet Stak's



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

group had climbed, and he said that if the clouds they reported hadn't reached the *Kwembly* yet he wanted to know as exactly as possible the time they do. I'm sorry; I should have reported that earlier."

"It doesn't matter," replied Dondragmer. "The sky is still clear here. I'll let you know the moment I see any clouds. Does this mean that he thinks another fog is coming, like the one which preceded the last flood?" In spite of his inborn defenses against worry, the captain waited out the next minute with some uneasiness.

"He didn't say, and he wouldn't. He's been caught too wrong too many times. He won't take the chance again, if I know him, unless it's a matter of warning you against some very probable danger . . . wait. There's something on Stak's screen." Dondragmer's many legs tensed under him. "Let me check . . . yes, all Stak's men but one are in sight, and that one must be carrying the back end of the set because it's still moving. There's another light ahead. It's brighter than the ones we're carrying—at least, I think so, but I can't really tell its distance. I'm not sure whether Stak's people have seen it yet—but they should have; you said your eyes are better than the pickups.

"Mother, do you want to get in on this? And should we call Barlennan? I'm keeping Don posted.

"Yes. Stak has seen it and his party has stopped moving. The light isn't moving either. Stak has the sound volume up, but I can't hear anything that means anything to me. They've put the transmitter down, and are fanning out in front of it; I can see all six of them now. The ground is nearly bare, only an occasional patch of ice. No rocks. Now Stak's men have put out their lights, and I can't see anything except the new one. It's getting brighter, but I guess it's just the pickup cells reacting to the darker field. I can't see anything around it; it looks a little foggy, if anything. Something has blocked it for a moment; no, it's on again. I could see enough of a silhouette to be pretty sure it was one of the search party—he must have reared up to get a better look ahead. Now I can hear some hooting, but it's not any words I know. I don't see why . . . wait.

"Now Stak's people are turning their lights back on. Two of them are coming back toward the set—they're picking it up and bringing it forward toward the rest of the group. All the lights are well in front with them, so I can see pretty well now. There's mist blowing past only a few feet—maybe a few inches—up; the new light *is* up in it a little way. I can't judge its distance yet at all. The ground has no marks to help; just bare stone, with six Mesklinites flattened down against it, and their lights, and a dark line beyond them which might



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

be different colored rock, or maybe a narrow stream slanting toward them from the far left and going out of sight to my right. Now I get a vague impression of motion around the new light. Maybe it's the running light of a helicopter—I don't know how they're arranged, or how high off the ground they are when the machine is parked, or how bright they are.

"Now it's clearer . . . yes, there's something moving. It's coming toward us, just a dark blob in the mist. It's not carrying any light. If my guess at distance means anything, which it probably doesn't, it's about the same size as the Mesklinites. Maybe it's Kervenser or Reffel—

"Yes. I'm almost sure it's a Mesklinite, but still too far away for me to recognize. I'm not sure I'd know either of those two anyway. He's crossing that line—it must be a stream; some liquid splashed up for a split second into the path of the light—now he's only a few yards away, and the others are converging on him. They're talking, but not loudly enough for me to make any of it out. The group is milling around, and I can't recognize anyone. If they'd come a little closer, I'd ask them who's there, but I suppose they'll report pretty soon anyway, and I can't make them hear through the airsuits unless they're right beside the set. Now they're all coming this way, and the bunch is opening out—two of them are right in front of the set; I suppose it's Stakendee and the one who's just—"

He was interrupted by a voice which originated beside him. It reached not only his ear, but three open microphones, and through them three different receivers on Dhrawn; and there it produced three very different results.

"Kabremm! Where have you been all these months?" cried Easy.

## XI

It really wasn't quite Kabremm's fault, though Barlennan was a long time forgiving him. The transmitter had been away from the lights. When the newcomer had first joined Stakendee's group he had not been able to see it; later he had failed to notice it; and not until he was within a foot or two did he recognize it. Even then he wasn't worried greatly; human beings all looked alike to him, he assumed that his own people looked at least as indistinguishable to the humans, and while he would not have put himself deliberately in view, a sudden withdrawal, or any attempt to hide, would have been far more suspicious than staying calmly where he was.

When Easy's voice erupted from the speaker with his name, it was obviously sixty-four seconds too late to do anything. Stakendee, whose reflex response to the sound was to reach for the shutter on the



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

top of the vision set, realized in time that this would only make matters worse.

What they should do was far from obvious to either of them. Neither was an expert in intrigue, though Mesklin's culture was no more innocent of political deceit than it was of the commercial variety. Neither was particularly quick-witted.

Kabremm, unlike Dondragmer, approved enthusiastically of the *Esket* project and of keeping it secret from the aliens. Even the *Kwembly*'s commander, a straightforward type who happened to like and trust human beings, admitted that it would be desirable for the Mesklinite group on Dhrawn to be as completely self-sustaining as possible; Kabremm and Destigmet not only admitted it but regarded it as the most important of the problems facing the expedition. Barlennan, who had much deeper thoughts in his own mind, was only too happy to use this as an excuse and to give the *Esket*'s crew responsibility for setting up the secret base.

Kabremm was, therefore, horrified at his slip, but utterly unable to think of anything to do about it—at least, anything not likely to conflict with what Barlennan was likely to do when the news reached him. He froze before the transmitter, wondering what would be his best line of action.

Barlennan, who also heard Easy's cry, was in exactly the same situation. He hadn't the slightest idea how or why Kabremm had wound up anywhere near the *Kwembly*, though the incident of Reffel's communication cutoff had prepared him for something of the sort. Only one of the three dirigibles was employed on the regular shuttle run between the *Esket* site and the Settlement; the others were under Destigmet's control and were usually exploring. Still, Dhrawn was large enough to make the presence of one of them in the *Kwembly*'s neighborhood a distinct surprise.

However, it seemed to have happened. It was simply bad luck, Barlennan assumed—compounded by the fact that probably the only human being in the universe who could possibly have recognized Kabremm by sight had been in a position to see him when the slip occurred.

So the human beings now knew that the *Esket*'s crew had not been obliterated. No provision had been made for such a discovery; no planned, rehearsed story existed which Barlennan could count on Kabremm's using. Maybe Dondragmer would fill in—he could be counted on to do his best, no matter what he thought of the whole matter—but it was hard to see what he *could* do. The trouble was that Barlennan himself would have no idea what Dondragmer said, and would not know what to say himself when questions came, as



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

they surely would, toward the Settlement. Probably the safest tactic was to claim utter ignorance, and ask honestly for as complete a report as possible from Dondragmer. The captain would at least keep Kabremm, who had obviously been playing the fool, from leaking the whole cask.

It was fortunate for Barlennan's peace of mind that he did not realize where Kabremm had been met. Easy, a few seconds before her cry of recognition, had told him that Benj was reporting something from a *Kwembly* screen, or he would have assumed that Kabremm had inadvertently stepped into the field of view of an *Esket* communicator. He knew no details about the search party of Stakendee, and assumed the incident to be occurring *at* the *Kwembly* and not five miles away. The five miles was just as bad as five thousand, under the circumstances; communication between Mesklinites not within hooting range of each other had to go through the human linkage, and Dondragmer was in no better position to cover the slip than was Barlennan himself. However, the *Kwembly*'s captain managed to do it, quite unintentionally.

He, too, had heard Easy's exclamation, much more loudly than Barlennan in view of the woman's position among the microphones. However, it had been little more than a distraction to him, for his mind was wholly taken up with some words Benj had uttered a few seconds before. In fact, he was so disturbed by them as to do something which everyone at all experienced in Dhrawn-satellite communication had long ago learned not to do. He had interrupted, sending an urgent call of his own pulsing upward to the station while Benj was still talking.

"Please! Before you do anything else, tell me more about that liquid. I get the impression from what you've said that there is a stream flowing in the riverbed in view of Stakendee's vision pickup. If that is the case, please send these orders immediately: Stak, with two men to carry the communicator, is to follow that stream upward immediately, keeping you and through you me informed of its nature—particularly, is it growing any larger? The other three are to follow it down to find how close it comes to the *Kwembly*; when they have ascertained this they are to come in with the information at once. I'll worry about whom you've found later on; I'm glad one of them has turned up. If this trickle is the beginning of the next flood, we'll have to stop everything else and get life-support equipment out of the ship and out of the valley. Please check, and get those orders to Stakendee at once!"

This request began to come in just as Easy finished her sentence, and long before either Kabremm or



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Barlennan could have got a reply back to it. Mersereau and Aucoin were still gone, so Benj had no hesitation about passing Dondragmer's orders along; and Easy, after a second or two of thought, shelved the Kabremm question and reported the same information to Barlennan. If Don saw the situation as an emergency, she was willing to go along with his opinion; he was on the scene. She did not take her eyes from the screen which showed Kabremm's image, however; his presence still needed explanation. She, too, helped Barlennan unwittingly at this point.

After completing the relay of Dondragmer's orders, she added a report of her own which clarified much for the commander.

"I don't know how up to date you are, Barl; things have been happening rather suddenly. Don sent out a foot party with a communicator to look for Kervenser and Reffel. This was the group which found the running stream which is bothering Don so much, and at the same time ran into Kabremm. I don't know how he got there, thousands of miles from the *Esket*, but we'll get his story and relay it to you as soon as we can. I've sometimes wondered whether he and any of the others were alive, but I never really hoped for it. I know the life-support equipment in the cruisers is supposed to be removable in case the vehicles had to be abandoned; but there was never any sign of anything being taken from the *Esket*. This will be useful news as well as pleasant; there must be some way for you people to live on at least some parts of Dhrawn without human equipment."

Barlennan's answer was a conventional acknowledgment-plus-thanks, given with very little of his attention. Easy's closing sentence had started a new train of thought in his mind.

Benj had paid little attention to his mother's words, having a conversation of his own to maintain. He relayed Dondragmer's command to the foot party, saw the group break up accordingly—though he failed to interpret the confusion caused by Kabremm's telling Stakendee how he had reached the spot—and reported the start of the new mission to the captain. He followed the report, however, with comments of his own.

"Captain, I hope this isn't going to take all your men. I know there's a lot of work in getting your life equipment to the bank, but surely you can keep on with the job of melting the *Kwembly* loose. You're not just giving up in the ship, are you? And you still have Beetch and his friend underneath—you can't just abandon them. It won't take many men to get the heater going, it seems to me."

Dondragmer had formed by now



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a pretty clear basic picture of Benj's personality, though some detailed aspects of it were fundamentally beyond his grasp. He answered as tactfully as he could.

"I'm certainly not giving up the *Kwembly* while there's any reasonable chance of saving her," he said, "but the presence of liquid only a few miles away forces me to assume that the risk of another flood is now very high. My crew, as a group, comes first. The metal bar we have cut from the hull will be lowered to the ground in a few more minutes. Once that is done, only Borndender and one other man will be left on the heater detail. Everyone else, except, of course, Stakendee's crew, will start immediately carrying plant tanks and lights to the side of the valley. I do not want to abandon my helmsmen, but if I get certain news that high water is on the way we are all going to head for higher ground whether or not any are still missing. I gather you don't like the idea, but I am sure you see why there is no other possible course." The captain fell silent, neither knowing nor greatly caring whether Benj had an answer for this; there was too much else to consider.

He stood watching as the heavy length of metal, which was to be a heater if everyone's ideas worked out, was eased toward the *Kwembly*'s starboard side. Lines were attached to it, snubbed around the climbing holdfasts, and held by men on the ice who were carefully giving length under the orders of Praffen. The latter, perched on the helicopter lock panel with his front end reared four inches higher, watched and gestured commands as the starboard part of the long strip of metal slid slowly away from him and the other side approached. Dondragmer cringed slightly as the sailor seemed about to be brushed off the hull by the silvery length of alloy, but Praffen let it pass under him with plenty of legs still on the plastic and at least three pairs of pincers gripping the holdfasts. With this personal risk ended he let the rope men work a little faster, and it took less than five more minutes to get the bar down to the ice.

Dondragmer had redonned his airsuit during the last part of the operation and gone out on the hull again, where he hooted a number of orders. Everyone else outside obediently headed for the main lock to start transferring the life-support equipment; the captain himself reentered the bridge to get back in radio contact with Benj and Stakendee.

The boy had said nothing during the lowering-away, which had been carried out in view of the bridge communicator. What he could see required no explanation. He was a little unhappy at the disappearance



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

of the crew afterward, for, of course, Dondragmer had been right; Benj did not like the idea of the entire group being diverted to the abandon-ship operation. However, the emergence of two Mesklinites with a power box gave him something to watch besides Stakendee's upstream crawl on the adjacent screen.

Benj did not know which of the two was Borndender, but wasn't worried. Their actions were of more interest. And their troubles with the radiator made interesting watching.

The wire was rigid enough to have held its shape fairly well as it was moved, and now lay flat on the ice in much the same form it had had when attached to the hull—that is, rather like a long, narrow hairpin with a set of right-angle bends near the center where it had outlined the helicopter lock, and the cut ends some two feet apart. The original vertical component of its curvature which had been impressed by the shape of the hull had flattened out under gravity. The unit had been turned over during the lowering so that the prongs which had attached it to the plastic were now pointing upward; hence there was good contact with the ice for practically its entire length.

The Mesklinites spent a few minutes trying to straighten it out; Benj got the impression that they wanted to run it around the side of the hull as closely as possible. However, it finally appeared to dawn on them that the free ends would have to be close together anyway in order to go into the same power box, so they left the wire alone and dragged the power unit aft. One of them examined the holes in the box and the ends of the wire carefully, while the other stood by.

Benj could not see the box very well, since its image on the screen was very small, but he was familiar with similar machines. It was a standard piece of equipment which had needed very little modification to render it usable on Dhrawn. There were several kinds of power takeoff on it besides the rotating field used for mechanical drive. The direct electrical current which Borndender wanted could be drawn from any of several places; there were contact plates on opposite sides of the box which could be energized, several different sizes of jack-type bipolar sockets, and simple unipolar sockets at opposite ends of the box. The plates would have been easiest, but the Mesklinites, as Benj learned later, had dismissed them as too dangerous; they chose to use the end sockets. This meant that one end of the "hairpin" had to go into one end of the unit, and the other into the other end. Borndender already knew that the wire was a little large for these holes and would have to be filed down, and had brought the appropriate tools out with him; this was



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

no problem. Bending the ends, however, so that short lengths of them pointed toward each other, was a different matter. While he was still working on this problem, the rest of the crew emerged from the main lock with their burden of hydroponic tanks, pumps, lights, and power units, and headed northward toward the side of the valley. Borndender ignored them, except for a brief glance while he was wondering whether he could commandeer some assistance.

The two ninety-degree bends he had to make were not entirely a matter of strength. The metal was of semicircular cross section, about a quarter of an inch in radius—Benj thought of it as heavy wire, while to the Mesklinites it was bar stock. The alloy was reasonably tough even at a hundred and seventy degrees Kelvin, so there was no risk of breaking it; and Mesklinite strength was certainly equal to the task. What the two scientists lacked, which made the bending an operation instead of an incident, was traction.

The ice under them was fairly pure water with a modest percentage of ammonia, not so far either below its melting point or from the ideal ice crystal structure to have lost its slipperiness. The small area of the Mesklinite extremities caused them to dig in in normal walking, and this, combined with their low structure and multiplicity of legs, prevented slipping in ordinary walking around the frozen-in *Kwembly*. Now, however, Borndender and his assistant were trying to apply a strong sidewise force, and their twenty pounds of weight simply did not give enough dig for their claws. The metal refused to bend, and the long bodies lashed about on the ice with Newton's Third Law in complete control of the situation. The sight was enough to make Benj chuckle in spite of his worry, a reaction which was shared by Seumas McDevitt, who had just come down from the weather lab.

Borndender finally solved his engineering problem by going back into the *Kwembly* and bringing out the drilling equipment. With this he sank half a dozen foot-deep holes in the ice, and by standing lengths of drill-tower support rod in these he was able to provide anchorage for the Mesklinite muscles. The metal was finally changed from hairpin to caliper shape.

Fitting the ends into the appropriate holes was comparatively easy after the filing was finished. It involved a modest lifting job to get the wire up to the two-inch height of the socket holes, but this gave no problem either for strength or traction and was done in half a minute. With some hesitation, visible even to the human watchers, Borndender approached the controls of the power unit. The watchers were at least as tense; Dondrag-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

mer was not entirely sure that the operation was safe for his ship, having only the words of the human beings about this particular situation, and Benj and McDevitt had doubts about the efficacy of the jury-rigged heater.

The last were speedily settled. The safety devices built into the unit acted properly as far as the machine's own protection was concerned; they were not, however, capable of analyzing the exterior load in detail. They permitted the unit to deliver a current—not a voltage—up to a limit determined by the manual control setting. Borndender had, of course, set this at the lowest available value. The resistor lasted for several seconds, and might have held up indefinitely if the ends had not been off the ice.

For most of the length of the loop, all went well. A cloud of microscopic ice crystals began to rise the moment the power came on, as water boiled away from around the wire and froze again in the dense, frigid air. It hid the sight of the wire sinking into the surface ice, but no one doubted that this was happening.

The last foot or so at each end of the loop, however, was not protected by the high specific and latent heats of water. Those inches of metal showed no sign of the load they were carrying for perhaps three seconds; then they began to glow. The resistance of the wire naturally increased with its temperature, and in the effort to maintain constant current the power box applied more voltage. The additional heat developed was concentrated almost entirely in the already overheated sections. For a long moment a red, and then a white, glow illuminated the rising cloud, causing Dondragmer to retreat involuntarily to the other end of the bridge while Borndender and his companion flattened themselves against the ice.

The human watchers cried out—Benj wordlessly, McDevitt protestingly, "It can't blow!" Their reactions were, of course, far too late to be meaningful. By the time the picture reached the station, one end of the wire loop had melted through and the unit had shut down automatically. Borndender, rather surprised to find himself alive, supplemented the automatic control with the manual one, and without taking time to report to the captain set about figuring what had happened.

This did not take him long; he was an orderly thinker, and had absorbed a great deal more alien knowledge than had the helmsmen who were still hoping for rescue a few yards away. He understood the theory and construction of the power units about as a good high school student understands the theory and construction of a television set—that is, he could not have built one himself, but could make a reasonable deduction about the cause



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

of a gross malfunction. He was more of a chemist than a physicist, as far as specific training went.

While the human beings watched in surprise, and Dondragmer in some uneasiness, the two scientists repeated the bending operation until what was left of the resistor was once again usable. With the drilling equipment they made a pit large enough to hold the power box at the end of the deep groove boiled in the ice by the first few seconds of power. They set the box in the hole, connected the ends once more, and covered everything with chips of ice removed in the digging, leaving only the controls exposed. Then Borndender switched on the power again, this time retreating much more hastily than before.

The white cloud reappeared at once, but this time grew and spread. It enveloped the near side of the *Kwembly,* including the bridge, blocking the view for Dondragmer and the communicator lens. Illuminated by the outside flood lamps, it caught the attention of the crew, now nearing the edge of the valley, and of Stakendee and his men miles to the west. This time the entire length of the wire was submerged in melted ice, which bubbled away from around it as hot vapor, condensed to liquid a fraction of a millimeter away, evaporated again much less violently from the surface of the widening pool, and again condensed, this time to ice, in the air above. The steaming pool, some three quarters of the *Kwembly*'s length and originally some six feet in width, began to sink below the surrounding ice as its contents were borne away as ice dust by the gentle wind faster than they were replenished by melting.

One side of it reached the cruiser, and Dondragmer, catching a glimpse of it through a momentary break in the swirling fog, suddenly had a frightening thought. He donned his airsuit hurriedly and rushed to the inner door of the main lock. Here he hesitated; with the suit's protection he could not tell by feel whether the ship was heating dangerously, and there were no internal thermometers except in the lab. For a moment he thought of getting one; then he decided that the time needed might be risky, and opened the upper safety valves in the outer lock, which were handled by pull-cords from inside reaching down through the liquid trap. He did not know whether the heat from outside would last long enough to boil ammonia in the lock itself—the *Kwembly*'s hull was well insulated, and leakage would be slow—but he had no desire to have boiling ammonia confined aboard his command. It was actually an example of a little knowledge causing superfluous worry; the temperature needed to bring ammonia's vapor pressure anywhere near the current



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ambient value would have made an explosion the least of any Mesklinite's concerns. However, no real harm was done by opening the valves, and the captain felt better as a result of the action. He returned hastily to the bridge to see what was going on.

A gentle breeze from the west was providing occasional glimpses by sweeping the ice fog aside, and he could see that the level of the molten pool was lower. Its area had increased greatly, but as the minutes passed he decided that some sort of limit had been reached in that respect. His two men were visible at times, crawling here and there trying to find a good viewpoint. They finally settled down almost under the bridge, with the breeze behind them.

For some time even the liquid level seemed to reach a steady state, though none of the watchers could understand why. Later they decided that the spreading pool had melted its way into the still-liquid reservoir under the *Kwembly*, which took fully fifteen minutes to evaporate. By the end of that time, cobbles from the river bottom began to show their tops above the simmering water, and the problem of turning the power unit off before another length of wire was destroyed suddenly occurred to Dondragmer.

He knew now that there was no danger of the power unit blowing up; however, several inches of the wire had already melted away, and there was going to be trouble restoring the refrigerator to service. This situation should not be allowed to get any worse, which it would if more metal were lost. Now, as the water level reached the cobbles and the wire ceased to follow the melting ice downward, the captain suddenly wondered whether he could get out to the controls fast enough to prevent the sort of shut-off which had occurred before. He wasted no time mentally blasting the scientists for not attaching a cord to the appropriate controls; he hadn't thought of it in time either.

He donned his suit again and went out through the bridge lock. Here the curve of the hull hid the pool from view, and he began to make his way down the holdfasts as rapidly as he could in the poor visibility. As he went, he hooted urgently to Borndender, "Don't let the wire melt again! Turn off the power!"

An answering, but wordless, bellow told him that he had been heard, but no other information came through the white blankness. He continued to grope his way downward, finally reaching the bottom of the hull curve. Below him, separated from his level by the thickness of the mattress and two thirds the height of the trucks, was the gently steaming surface of the water. It was not, of course, ac-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tively boiling at this pressure; but it was hot even by human standards, and the captain had no illusions about the ability of an airsuit to protect him from it. It occurred to him, rather late, that there was an excellent chance that he had just cooked his two missing helmsmen to death, but this was a passing thought; there was work to be done.

The power box lay well aft of his present position, but the nearest surface on which he could walk had to be forward. Either way there was going to be trouble reaching the unit, now presumably well surrounded by hot water; but if jumping were going to be necessary, the hull holdfasts were about the poorest possible takeoff point. Dondragmer went forward.

This brought him into clear air almost at once, and he saw that his two men were gone. Presumably they had started around the far side of the pool in the hope of carrying out his order. The captain continued forward, and in another yard or two found it possible to descend to solid ice. He did so, and hastened on what he hoped was the trail of his men.

He had to slow down almost at once, however, as his course brought him back into the ice fog. He was too close to the edge of the pool to take chances. As he went he called repeatedly, and was reassured to hear each hoot answered by another. At least, his men had not yet fallen in.

He caught up with them almost under the cruiser's stern, having walked entirely around the part of the pool not bounded by the hull. None of them had accomplished anything; the power unit was not only out of reach but out of sight. Jumping would have been utter lunacy, even if Mesklinites normally tended to think of such a thing. Borndender and his assistant had not, and the idea had only occurred to Dondragmer because of his unusual experiences in Mesklin's low-gravity equatorial zone so long before.

But there could not be much more time. Looking over the edge of the ice, the three could catch glimpses of the rounded tops of the rocks, separated by water surfaces which narrowed as they watched. The wire must be practically out of water by now; chance alone would not have let it settle between the stones to a point much lower than their average height, and the protecting water was already there. The captain had been weighing the various risks for minutes; without further hesitation, and without issuing any orders, he slipped over the edge and dropped two feet to the top of one of the boulders.

It was the energy equivalent of an eight-story fall on Earth, and even the Mesklinite was jolted. However, he retained his self-command. A single hoot told those above that he had survived without serious injury, and warned them



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

against following in case pride might have furnished an impulse which intelligence certainly would not. The captain, with that order issued, relegated the scientists to the back of his mind and concentrated on the next step.

The nearest rock with enough exposed area to accommodate him was two feet—well over a body length—away, but it was at least visible. Better still, another one only slightly off the line to it exposed a square inch or so of its surface; and two seconds after analyzing this situation, Dondragmer was two feet closer to the power box and looking for another stopping point. The lone square inch of the stepping stone had been touched by perhaps a dozen feet as the red-and-black length of his body had ricocheted from it to the second rock.

The next stage was more difficult. It was harder to be sure which way to go, since the hull which had furnished orientation was now barely visible also, there were no more large surfaces as close as the one from which he had come. He hesitated, looking and planning; but before he reached a decision the question was resolved for him. The grumbling sound which had gone on for so many minutes as water exploded into steam against the hot wire and almost instantly collapsed again under Dhrawn's atmospheric pressure abruptly ceased, and Dondragmer knew that he was too late to save the metal. He relaxed immediately and waited where he was while the water cooled, the evaporation slowed, and the fog of ice crystals cleared away. He himself grew uncomfortably warm, and was more than once tempted to return the way he had come but the two-foot climb up an ice overhang with hot water at its foot, which would form part of the journey, made the temptation easy to resist. He waited.

He was still alive when the air cleared and crystals of ice began to grow around the edges of the rocks. He was some six feet from the power unit, and was able to reach it by a rather zigzag course over the cobbles once the way could be seen. He shut off the power controls, and only when that was done did he look around.

His two men had already made their way along the ice cliff to a point about level with the original front bend of the wire; Dondragmer guessed that this must be where the metal had melted through this time.

In the other direction, under the bulking hull, was a black cavern where the *Kwembly*'s lights did not reach. The captain had no real wish to enter it; it was very likely that he would find the bodies of his two helmsmen there. His hesitation was observed from above.

"What's he waiting there at the power box for?" muttered



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

McDevitt. "Oh, I suppose the ice isn't thick enough for him yet."

"That's not all of it, I'd guess." Benj's tone made the meteorologist look sharply away from the screen.

"What's the matter?" he asked.

"You must know what's the matter. Beetch and his friend were under there. They must have been. How could they have gotten away from that hot water? I bet the captain only just thought of it—he'd never have let them use that way if he'd seen what would happen, any more than I would have."

McDevitt thought rapidly; the boy wouldn't be convinced, or even comforted, by anything but sound reasoning, and McDevitt's soundest reasoning suggested that Benj's conclusion was probably right. However, he tried.

"It looks bad, but don't give up. It doesn't look as though this thing melted its way all the way across under the ship, but it might have; and either way there's some hope. If it did, they could have got out the other side, which we can't see; if it didn't, they could have stayed right at the edge of the liquid zone, where the ice could have saved them. Also, they may not have been under there."

"Water ice save them? I thought you said that this stuff froze because it lost its ammonia, not because the temperature went down. Water ice at its melting point—zero centigrade—would give heatstroke to a Mesklinite."

"That was my guess," admitted the meteorologist, "but I'm certainly not sure of it. I don't have enough measurements of any sort. I admit your little friend may have been killed; but we know so little of what has happened down there that it would be silly to give up hope. Just wait—there's nothing else to do at this distance anyway. Even Dondragmer is staying put. You can trust him to check as soon as it's possible."

Benj restrained himself, and did his best to look for bright possibilities; but the eye he was supposed to be keeping on Stakendee remained fixed on the captain's image.

Several times Dondragmer could be seen to extend part of his length onto the ice, but each time he drew back again, to the boy's intense annoyance. At last, however, he seemed satisfied that the ice would hold his weight, and inch by inch extended himself entirely onto the newly frozen surface. Once off the power box he waited for a moment as though expecting something to happen; but the ice held, and he resumed his way toward the side of the *Kwembly*. The human beings watched, Benj's fists clenched tightly and even the man more tense than usual.

Of course they could hear nothing. Not even the hoot which suddenly echoed across the ice penetrated the bridge to affect their communicator. They could not



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

even guess why Dondragmer suddenly turned back from the hull as he was about to disappear under it. They could only watch as he raced back across the ice to a point just below his two men and waved excitedly at them, apparently indifferent to whatever there was to be learned about the fate of his helmsman and Benj's friend.

## XII

Dondragmer was far from indifferent, but by his standards it was normal to focus attention on a new matter likely to require action rather than clear up an old one where action was unlikely to help. He had not dropped the fate of his men from mind, but when a distant hoot bore the words: "Here's the end of the stream" to him his program changed abruptly and drastically.

He could not see where the voice was coming from, since he was two feet below the general surface, but Borndender reported glimpses of a light perhaps half a mile away. At the captain's order, the scientist climbed the hull part way to get a better view, while his assistant went in search of a rope to get the captain out of the ice pit. This took time. The sailors had, with proper professional care, returned the lines used in lowering the radiator bar to their proper places inside the cruiser; and when Skendra, Borndender's assistant, tried to get through the main lock he found it sealed by a layer of clear ice which had frozen a quarter of an inch thick on the starboard side of the hull, evidently from the vapor emitted by the hot pool. Fortunately most of the holdfasts were projecting far enough through this to be usable, so he was able to climb on up to the bridge lock.

Meanwhile, Borndender called down that there were two lights approaching across the riverbed. At the captain's order, he howled questions across the thousand-yard gap, and the two listened carefully for answers—even Mesklinite voices had trouble carrying distinct words for such a distance and through two layers of airsuit fabric. By the time Dondragmer was out of the hole, they knew that the approaching men were the part of Stakendee's command which had been ordered to follow down the stream, and that they had reached its end less than a mile from the ship; but until the group actually reached them, no further details could be made out.

Even then, they could not entirely understand it; the description did not match anything familiar to them.

"The river stayed about the same size all the way down," the sailors reported. "It wasn't being fed from any where, and didn't seem to be evaporating. It wound among the stones a lot, when it got down to where they were. Then we began to



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

run into the funniest obstructions. There would be a sort of dam of ice, with the stream running around one end or the other of it. Half a cable or so farther on there'd be another dam, with just the same thing happening. It was as though some of it froze when it met the ice among the stones, but only the beginning part. The water that followed stayed liquid and went on around the dam until *it* found some ice. The dams would build up to maybe half a body length high before the following water would find its way around We reached the last one, where it was still happening, just a few minutes ago. We'd seen the bright cloud rising over the ship before that, and wondered whether we ought to come back in case something was wrong; but we decided to carry out orders at least until the river started to lead us away from the *Kwembly* again."

"Good," said the captain. "You're sure the stream wasn't getting any bigger?"

"So far as we could judge, no."

"All right. Maybe we have more time than I thought, and it isn't a forerunner of the same thing that brought us here. I wish I understood why the liquid was freezing in that funny way, though."

"We'd better check with the human beings," suggested Borndender, who had no ideas on the matter either, but preferred not to put the fact too bluntly.

"Right. And they'll want measurements and analyses. I suppose you didn't bring a sample of that river," he said, rather than asked, the newcomers.

"No, sir. We had nothing to carry it in."

"All right. Born, get containers and bring some back; analyze it as well and as quickly as you can. One of these men will guide you. I'll go back to the bridge and bring the humans up to date. The rest of you get tools and start chipping ice so we can use the main lock."

Dondragmer closed the conversation by starting to climb the ice-crusted hull. He waved toward the bridge as he went, assuming that he was being watched and perhaps even recognized.

Benj and McDevitt had managed to keep track of him, though neither found it easy to tell Mesklinites apart, and were waiting eagerly when he reached the bridge to hear what he had to say. Benj in particular had grown even more tense since the search under the cruiser had been interrupted; perhaps the helmsmen had not been there after all—perhaps they had been among the newcomers who had arrived to interrupt the search—perhaps—perhaps . . .

McDevitt was a patient man by nature and liked the youngster, but even he was getting irritated by the time Dondragmer's voice reached the station.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The report fascinated the meteorologist, though it was no consolation to his young companion. Benj wanted to interrupt with a question about Beetchermarlf, but knew that it would be futile; and when the captain's account ended, McDevitt immediately began to talk.

"This is not much more than a guess, Captain," he began, "though perhaps your scientist will be able to stiffen it when he analyzes those samples. It seems possible that the pool around you was originally an ammonia-water solution—we had evidence of that before—which froze, not because the temperature went down, but because it lost much of its ammonia and its freezing point went up. The fog around you just before this whole trouble started, back on the snowfield, was ammonia, your scientists reported; I'm guessing that it came from the colder areas far to the west. Its droplets began to react with the water ice, and melted it partly by forming a eutectic and partly by releasing heat—you were afraid of something of that sort even before it happened, as I remember. That started your first flood. When the ammonia cloud passed on into Low Alpha, the solution around you began to lose ammonia by evaporation, and finally the mixture which was left was below its freezing point. I'm guessing that the fog encountered by Stakendee is more ammonia, and provided the material for the rivulet he found. As it meets the water ice near you they dissolve mutually until the mixture is too dilute in ammonia to be liquid any more—this forms the dam your men described, and the liquid ammonia still coming has to find a way around. I would suggest that if you can find a way to divert that stream over to your ship, and if there proves to be enough of it, your melting-out problem would be solved." Benj, listening in spite of his mood, thought of wax flowing from a guttering candle and freezing first on one front and then another. He wondered whether the computers would handle the two situations alike, if ammonia and heat were handled the same way in the two problems.

"You mean I shouldn't worry about a possible flood?" Dondragmer's voice finally returned.

"I'm guessing not," replied McDevitt. "If I'm right about this picture, and we've been talking it over a lot up here, the fog that Stakendee met should have passed over the snow plain you came from—or what's left of it—and if it were going to cause another flood that should have reached you by now. I suspect the snow, which was high enough to spill into the pass you were washed through, was all used up on the first flood, and that's why you were finally left stranded where you are. If the new fog hasn't reached you yet by the way, I think I know the reason.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The place where Stakendee met it is a few feet higher than you are, and air flowing from the west is coming downhill. With Dhrawn's gravity and that air composition there'd be a terrific foehn effect-adiabatic heating as the pressure rises—and the stuff is probably evaporating just as it gets to the place where Stakendee met it."

Dondragmer took a while to digest this. For a few seconds after the normal delay time, McDevitt wondered whether he had made himself clear; then another question came through.

"But if the ammonia fog were simply evaporating, the gas would still be there, and must be in the air around us now. Why isn't it melting the ice just as effectively as though it were in liquid drops? Is some physical law operating which I missed in the College?

"I'm not sure whether state and concentration would make all that difference, just from memory," admitted the meteorologist. "When Borndender gets the new data up here I'll feed the whole works into the machine to see whether this guess of ours is ignoring too many facts. On the basis of what I have now, I still think it's a reasonable one, but I admit it has its fuzzy aspects. There are just too many variables; with only water they are practically infinite, if you'll forgive a loose use of the word, and with water and ammonia together the number is squared, if not worse.

"To shift from abstract to concrete, I can see Stakendee's screen and he's still going along beside that streamlet in the fog; he hasn't reached the source, but I haven't seen any other watercourses feeding in from either side. It's only a couple of your body-lengths wide, and has stayed about the same all along."

"That's a relief," came the eventual response. "I suppose if a real flood were coming that river would be some indication. Very well, I'll report again as soon as Borndender has his information. Please keep watching Stakendee. I'm going outside again to check under the hull; I was interrupted before." The meteorologist had wanted to say more, but was silenced by the realization that Dondragmer would not be there to hear his words by the time they arrived. He may also have been feeling some sympathy for Benj.

They watched eagerly, the man almost as concerned as the boy, for the red-and-black inchworm to appear on the side of the hull within range of the pickup. It was not visible all the way to the ground, since Dondragmer had to go forward directly under the bridge and out of the field of view; but they saw him again near the point where the rope which had been used to get him out a few minutes earlier was still snubbed around one of Borndender's bending posts.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

They watched him swarm down the line into the pit. A Mesklinite hanging on a rope about the thickness of a six-pound nylon fishline, and free to swing pendulum-style in forty Earth gravities, is quite a sight even when the distance he has to climb is not much greater than his own body length. Even Benj stopped thinking about Beetchermarlf for a moment.

The captain was no longer worried about the ice; it was presumably frozen all the way to the bottom by now, and he went straight toward the cruiser without bothering to stay on the stones. He slowed a trifle as he drew near, eyeing the cavity in front of him thoughtfully.

Practically, the *Kwembly* was still frozen in, of course. The melted area had reached her trucks for a distance of some sixty feet fore and aft, but the ice was still above the mattress beyond those limits and on the port side. Even within that range, the lower part of the treads had still been an inch or two under water when the heater gave out. Beetchermarlf's control cables had been largely freed, but of the helmsman himself there was no sign whatever. Dondragmer had no hope of finding the two alive under the *Kwembly*; they would obviously have emerged long ago had this been the case. The captain would not have offered large odds on the chance of finding bodies, either. Like McDevitt, he knew that there was an unevaluable probability that the crewmen had not been under the hull at all when the freeze-up occurred. There had, after all, been two other unexplained disappearances; Dondragmer's educated guess at the whereabouts of Kervenser and Reffel was far from a certainty even in his own mind.

It was dark underneath, out of range of the floods. Dondragmer could still see—a response to abrupt changes of illumination was a normal adaptation to Mesklin's eighteen-minute rotation period—but some details escaped him. He saw the condition of the two trucks whose treads had been ruined by the helmsmen's escape efforts, and he saw the piles of stones they had made in the attempt to confine the hot water in a small area; but he missed the slash in the mattress where the two had taken final refuge.

What he saw made it obvious, however, that at least one of the missing men had been there for a while. Since the volume which had evidently not frozen at all was small, the most likely guess seemed to be that they had been caught in the encroaching ice after doing the work which could be seen—though it was certainly hard to see just how this could have happened. The captain made a rapid check the full length of the ice-walled cavern, examining every exposed truck fore and aft, top and sides. It never occurred to him to look higher. He



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

had, after all, taken part in the building of the huge vehicle; he knew there was nowhere higher to go.

He emerged at last into the light and the view field of the communicator. His appearance alone was something of a relief to Benj; the boy had concluded, just as the captain had, that the helmsmen could not be under the hull alive, and he had rather expected to see Dondragmer pulling bodies after him. The relief was only relative, of course; the burning question remained—where was Beetchermarlf? The captain was climbing out of the pit and leaving the field of view. Maybe he was coming back to the bridge to make a detailed report. Benj, now showing clearly the symptoms of sleeplessness, waited silently with his fists clenched.

But Dondragmer's voice did not come. The captain had planned to tell the human observers what he had found, indeed; but on the way up the side of the hull, visible to them but unrecognized, he paused to talk to one of the men who was chipping ice from the lock exit.

"I only got what the human Hoffman told me about what you found when your party first reached that stream," he said. "Are there any more details I should know? I have the picture that you had just met someone at the point where the ground was almost up into the fog, but I never heard from Hoffman whether it was Reffel or Kervenser. Who was it? And are the helicopters all right? There was an interruption just then—someone up above apparently caught sight of Kabremm back at the *Esket*, and I cut in myself because the stream you had found worried me. That's why I split your party. Who was it you found?"

"It was Kabremm."

Dondragmer almost lost his grip on the holdfasts.

"Kabremm? Destigmet's first officer? Here? And a human being recognized him—it was *your* screen he was seen on?"

"It sounded that way, sir. He didn't see our communicator until it was too late, and none of us thought for an instant that there was a chance of a human being telling one of us from another—at least, not between the time we recognized him ourselves and the time it was too late."

"But what is he doing here? This planet has three times the area of Mesklin; there are plenty of other places to be. I knew the commander was going to hit shoals sooner or later playing this *Esket* trick on the human beings, but I certainly never thought he'd ground on such silly bad luck as this."

"It's not entirely chance, sir. Kabremm didn't have time to tell us much—we took advantage of your order about exploring the stream to break up and get him out



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

of sight of the communicator—but I understand this river has been giving trouble most of the night. There's a buildup of ice five million or so cables downstream, not very far from the *Esket*, and a sort of ice river is flowing slowly into the hot lands. The *Esket* and the mines and the farms are right in its way."

"Farms?"

"That's what Destigmet calls them. Practically a Settlement with hydroponic tanks—a sort of oversized life-support rig that doesn't have to balance as closely as the cruiser ones do. Anyway, Destigmet sent out the *Gwelf* under Kabremm to explore upstream in the hope of finding out how bad the ice river was likely to get. They had grounded where we met them because of the fog—they could have flown over it easily enough, but they couldn't have seen the riverbed through it."

"Then they must have arrived since the flood that brought us here, and if they were examining the riverbed they flew right over us. How could they possibly have missed our lights?"

"I don't know, sir. If Kabremm told Stakendee, I didn't hear him."

Dondragmer gave the rippling equivalent of a shrug. "Probably he did, and made it a point to stay out of reach of our human eyes. I suppose Kervenser and Reffel ran into the *Gwelf*, and Reffel used his vision shutter to keep the dirigible from human sight; but I still don't see why Kervenser, at least, didn't come back to report."

"I'm afraid I don't know about any of that, either," replied the sailor.

"Then the river we've washed into must bend north, if it leads to the *Esket* area." The other judged correctly that Dondragmer was merely thinking out loud, and made no comment. The captain pondered silently for another minute or two. "The big question is whether the commander heard it, too, when the human—I suppose it was Mrs. Hoffman; she is about the only one that familiar with us—called out Kabremm's name. If he did, he probably thought that someone had been careless back at the *Esket*, as I did. You heard her on your set and I heard her on mine, but that's reasonable; they're both *Kwembly* communicators, and probably all in one place up at the station. We don't know, though, about their links with the Settlement. I've heard that all their communication equipment is in one room, but it must be a big room and the different sets may not be very close together. It's equally possible that Barl did, or did not, hear her.

"What it all shapes up to is that one human being has recognized an *Esket* crew member, not only alive long after they were all supposed to be dead, but five or six million cables from the place where



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

they presumably died. We don't know how certain this human being was of the identification; certain enough to call Kabremm's name on impulse, maybe not certain enough to report to other humans without further checking. After all, such a report could sound pretty silly without strong evidence. We don't know whether Barlennan knows of this slip; and worst of all, we can't tell what he's likely to answer when questions about it come his way. His safest and most probable line would be complete ignorance seasoned with shocked amazement, and I suppose he'll realize that, but I certainly wish I could talk to him without having human beings along the corridor."

"Wouldn't your best line be complete ignorance, too?" queried the sailor. Like all the Mesklinites on Dhrawn, he was fully aware of the trick being played on the human beings to get the *Esket* off their books. He also knew as much of the reason for it as Barlennan had made public. Very few—Dondragmer not among them—had been let all the way into the commander's thinking.

"It would be," the captain answered, "but I can't get away with it. I've already told the humans about your return. The most hopeful notion I have at the moment centers around the possibility of mistaken identity; how sure is Mrs. Hoffman, or whoever it was—the more I think of it, the more certain I am it was her voice; I wish I'd been paying more attention—that it was really Kabremm she saw? How does she tell us apart anyway? Coloration pattern? Walking style? Can she recognize any of us at a glance, or just a few whom she knows especially well, or does one have to have a missing leg, or no red on his head?

"I'd use that line, except that I just don't know what Barlennan is going to do—or if he's in a position to have to do anything. If he didn't hear that call, and the human is really suspicious, it wouldn't take many trick questions to catch him out. Even if he did, and is warned, he's in trouble, because then he'll be worrying about what I'm likely to say. That's the sort of thing I've been worried about ever since the beginning; with all long-distance communication having to go through the humans, coordination of this trick was bound to get difficult. If we could have avoided slips until Destigmet had made enough wire to reach from the mines to the Settlement, and gotten it strung, the chances of getting away with the whole thing would have gone up a lot."

"All that ever worried me," replied the sailor as he resumed his chipping at the ice, "was what would happen when they did learn about what we were doing. I don't suppose they'd really abandon us here—human beings don't seem to be quite that firm, even on business



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

deals—but they *could* as long as we don't have spaceships of our own."

"That was the basic argument the commander gave, as you know," returned Dondragmer. "They seem to be dependable beings, and personally I'd trust them as far as I would anyone, but they are different in some ways and one is never quite sure what they will consider an adequate motive, or excuse, for some action. That's why the commander wanted to get us self-supporting on this world without their knowing about it. I'm glad Destigmet has done so well with his 'farm.' The mines were a long step, and the dirigibles were a triumph; but we're a long, long way from being able either to make, or to do without, the human-made energy boxes; and I sometimes wonder if the commander realizes just how far beyond us those are.

"But that's not the immediate problem. I'm going to have to talk to the station again. I suppose my best policy is not to mention Kabremm unless they ask me, and if they do, try to convince them it was mistaken identity."

"Not mentioning it might make them suspicious," pointed out the sailor.

"It would be consistent with the mistaken-identity line, though. Thanks for the point; I hadn't considered it. Carry on, and give me a wave on the bridge when the lock is clear."

The sailor gestured agreement, and Dondragmer at last got to the bridge.

There was plenty to say to the human beings without mentioning Kabremm, and the captain began saying it as soon as he had doffed his airsuit.

"At least one of the helmsmen was under the hull for a while, and probably they both were, but I couldn't find any trace of either one just now except work they had done trying to get out—a least, I can't see any other reason for it; it certainly wasn't an assigned job. They wrecked, or nearly wrecked, two of the trucks in the process. Much of the space under there is still frozen up, and I'm afraid they're probably in the ice. We'll search more carefully, with lights, when the crew comes back and I can spare the men. The water, or whatever it was, that was boiled away by our heater coated an ice layer on the hull which has sealed the main lock; we must get that back into service as quickly as possible. There is much equipment which can't now be moved out if we have to abandon the *Kwembly*, and much which can't be moved back inside if we don't, because it won't go through any other lock.

"Also, the use of that heater caused the melting of about a body length of the radiator wire, and I don't see how we are going to restore the refrigerator to service if



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

we do get the *Kwembly* free. This may not be of immediate importance, but, if we do get back into service, we'd have to think twice about going very far into Low Alpha without refrigeration. One of the few things you people seem really sure of is that the low-pressure area is caused by high temperature, presumably from internal heat, and I know you set a very high priority on finding out about it. There is virtually no metal in the ship, and one of the few things I understand about that refrigerator is that its outside radiator must be an electrical conductor. Right?"

The captain waited for his reply with some interest. He hoped that the technical problem would divert human interest from the whole question of Kabremm and the *Esket*; but he knew that this would not have worked if he himself were on the other end of the conversation. Of course, Benj Hoffman was young—but he was probably not the only person there.

At least it was Benj who answered; but he didn't seem much interested in technology.

"If you think they're in the ice, shouldn't people get down there right away and look? They might still be alive in those suits, mightn't they? You said a while ago that no one had ever found out, but that at least they wouldn't suffocate. It seems to me that the longer you put off finding them, the less chance they have of living. Isn't that the most important problem right now?"

Easy's voice followed on, before Dondragmer could frame an answer; she seemed to be talking to her son as well as to the captain.

"It's not quite the most important. The *Kwembly* is synonymous with the lives of its entire crew, son. The captain is not being callous about his men. I know how you feel about your friend, and as a feeling it's perfectly proper; but a person with responsibility has to think as well as feel."

"I thought you were on my side."

"I feel with you very strongly; but that doesn't keep me from knowing the captain is right."

"I suppose Barlennan would react the same way. Have you asked him what Dondragmer should do?"

"I haven't asked him, but he knows the situation—if you don't think so, there's the microphone; give your side of it to him. Personally I don't think he'd dream of overriding Dondragmer or any other cruiser captain in such a matter, when he himself isn't on the scene." There was a pause while Benj hunted for words to refute this claim; he was still young enough to think that there was something fundamentally inhuman about thinking more than one step ahead at a time. After ten seconds or so of silence, Dondragmer assumed that the station transmission was over and a reply was in order.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Mrs. Hoffman—I believe I recognized her voice—is quite right, Benj. I have not forgotten Beetchermarlf, any more than you have forgotten Takoorch, although it is obvious even to me that you are thinking less of him. It is simply that I have more lives to consider than theirs. I'm afraid I'll have to leave any more discussion of it to her, right now. Would you please get some of your engineers thinking about the problem of my refrigerator? And you probably will see Borndender climbing the hull with his sample; the report about the stream should come up in a few minutes. If Mr. McDevitt is still there, please have him stand by; if he has left for any reason, will you please have him come back?"

The watchers had seen a climbing Mesklinite as the captain had said, though not even Easy had recognized Borndender. Before Benj could say anything, McDevitt answered, "I'm still here, Captain. We'll wait, and as soon as the analysis is here I'll take it to the computer. If Borndender has any temperature and pressure readings to send along with his chemical information, they will all be useful."

The boy was still unhappy, but even he could see that this was not the time for further interruption. Also, his father had just entered the communication room, accompanied by Aucoin and Mersereau. Benj tactfully slid out of the seat in front of the bridge screen to make room for the planner, though he was too angry and upset to hope that his badly-chosen words of the last few minutes would go unmentioned. He was not even relieved when Easy, in bringing the newcomers up to date, left the question of the missing helmsmen unmentioned.

Her account was interrupted by Dondragmer's voice.

"Borndender says that he has checked the density and boiling temperature of the liquid in the stream, and that it is about three eighths ammonia and five eighths water. He also says that the outside temperature is 71, the pressure 26.6 standard atmospheres—our standard, of course—and the wind a little north of west, 21 degrees to be more precise, at 120 cables per hour. A very light breeze. Will that suffice for your computer?"

"It will all help. I'm on my way," replied McDevitt as he slid from his seat and headed toward the door. As he reached the exit he looked back thoughtfully, paused, and called, "Benj, I hate to pull you from the screens right now, but I think you'd better come with me for a while. You should check me on the input, and you can bring the preliminary run back to report to Dondragmer while I do the recheck."

Easy kept her approval to herself as Benj silently followed his nomi-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

nal chief. The approval was divided between McDevitt, for veering the youngster's attention in a safer direction, and her son for a better example of self-control than she had really expected. She had known, of course, that he would not whine or throw a tantrum, but she would not have been surprised if he had come up with a reasonable excuse for staying at the screens.

Aucoin paid no attention to the exchange; he was still trying to clarify his picture of the current state of affairs.

"I take it that none of the missing personnel has turned up," he said. "All right, I've been thinking it over. I assume that Barlennan had been brought up to date, as we agreed a few hours ago. Is there anything else which has happened, and which he has been told about but I haven't?" Easy looked up quickly, trying to catch evidence of resentment on the administrator's face, but he seemed unaware that his words could possibly have been interpreted as criticism. She thought quickly before answering.

"Yes. Roughly three hours ago, Cavanaugh reported action on one of the *Esket* screens. He saw a couple of objects sliding or rolling across the floor of the laboratory from one side of the screen to the other. I started watching, but nothing has happened there since.

"Then an hour or so later, the search party Don had out for the missing helicopters met a Mesklinite which we, of course, assumed at first to be one of the pilots; but when he got close to the transmitter I recognized Kabremm, the first officer of the *Esket*."

"Six thousand miles from where the *Esket*'s crew is supposed to have died?"

"Yes."

"You told this to Barlennan?"

"Yes."

"What was his comment?"

"Nothing specific. He acknowledged the whole report, but didn't offer any theories."

"He didn't even ask you how sure you were of the identification? Or on what you based it?"

"No."

"Well, if you don't mind I'd like to. Just how did you know this Kabremm, and how certain are you that you were right?"

"I knew him, before the loss of the *Esket*, well enough to make it difficult to say what I went by—he's simply distinctive, in color pattern and stance and walk, just as you and Ib and Boyd are."

"The light was good enough for color pattern? It's night down there."

"There were lights near the set—though most of them were in front of it, in the field of view, and Kabremm was mostly backlighted."

"Do you know the two missing men well enough to be certain it was neither of them—do you know



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

that neither one looks much like Kabremm?"

Easy flushed. "It certainly wasn't Kervenser, Don's first officer. I'm afraid I don't know Reffel well enough to be sure; that possibility hadn't occurred to me. I just saw the man, and called out his name pretty much by reflex. After that I couldn't do much but make a report; the Settlement microphone was alive at the time, and Barlennan, or whoever was on duty, could hardly have helped hearing me."

"Then there is a reasonable chance that Barlennan's lack of comment was a polite attempt to avoid embarrassing you—to gloss over what may have seemed to him a silly mistake?"

"I suppose it's possible." Easy could not make herself sound anything but doubtful, but even she knew that her opinion was unlikely to be objective.

"Then I think," Aucoin said slowly and thoughtfully, "that I'd better talk to Barlennan myself. You say nothing more has happened at the *Esket* since Cavanaugh saw those objects rolling?"

"I haven't seen anything. The bridge set, of course, is looking out into darkness, but the other three are lighted perfectly well and have shown no change except that one."

"All right. Barlennan knows our language well enough, in my experience, so that I won't need you to translate."

"Oh, no; he'll understand you. You mean you'd rather I left?"

"No, no, certainly not. In fact, it would be better if you listened and warned me if you thought there might be any misunderstanding developing." Aucoin reached for the Settlement microphone switch, but glanced once more at Easy before closing it. "You don't mind, do you, if I make sure of Barlennan's opinion about your identification of Kabremm? I think our main problem is what to do about the *Kwembly*, but I'd like to settle that point, too. After you brought the matter up with him, I'd hate Barlennan to get the idea that we were trying to . . . well, censor anything, to phrase it the way Ib did at the meeting." He turned away and sent his call toward Dhrawn.

Barlennan was in the communicator chamber at the Settlement, so no time was lost reaching him. Aucoin identified himself, once he was sure the commander was at the other end, and began his speech.

Easy, Ib, and Boyd found it annoyingly repetitious, but they had to admire the skill with which the planner emphasized his own ideas. Essentially, he was trying to forestall any suggestion that another vehicle be sent to the rescue of the *Kwembly*, without himself suggesting such a thing. It was a very difficult piece of language manipulation, and even knowing that the matter had been uppermost in Aucoin's mind ever since the confer-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ence, so that it was anything but an impromptu speech, did not detract from its merit as a work of art—as Ib remarked later. He did mention Easy's identification of Kabremm to the commander, but so fleetingly that she almost failed to recognize the item. He didn't actually say that she must have been mistaken, but he was obviously attaching no importance to the incident.

It was a pity, as Easy remarked later, that such polished eloquence was so completely wasted. Of course Aucoin had no more way of knowing than did the other human beings that the identification of Kabremm was Barlennan's main current worry, and that for two hours he had been concerned with nothing else. Faced with the imminent collapse of his complex scheme and, as he suddenly realized with embarrassment, having no ready alternative, he had employed those hours in furious and cogent thought. By the time Aucoin had called, Barlennan had the first steps of another plan; and he was waiting so tensely for a chance to put it into operation that he paid little attention to the planner's beautifully selected words. When a pause came in their delivery, Barlennan had his own speech ready, though it had remarkably little to do with what had just been said.

The pause had not actually been meant as space for an answer; Aucoin had taken a moment to review mentally what he had covered and what should come next. Mersereau, however, caught him as he was about to resume talking.

"That break was long enough to let Barlennan assume you had finished and wanted an answer," he said. "Better wait. He'll probably have started talking before whatever you were just going to say gets down there." The administrator obediently waited; a convention was, after all, a convention. He was prepared to be sarcastic if Mersereau were wrong, but the Mesklinite commander's voice came through on the scheduled second—closer to it than they would have been willing to bet, Ib and Easy thought later.

"I've been thinking deeply ever since Mrs. Hoffman told me about Kabremm," he said, "and I've been able to come up with only one theory. As you know, we've always had to carry in mind the possibility that there was an intelligent species here on Dhrawn. Your scientists were certain there was highly organized life even before the landing, because of the oxygen-rich air, they said. I know we haven't run into anything but simple plants and practically microscopic animals, but the *Esket* had ventured farther into Low Alpha than any of the other cruisers, and conditions are different there; certainly the temperature is higher, and we don't know how that may change other factors.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Until now, the chance that the *Esket* had met intelligent opposition was only one possibility, with no more to support it than any other idea we could dream up. However, as your own people have pointed out repeatedly, none of her crew could have lived this long without the cruiser's support system or something like it; and they certainly couldn't have traveled from where the *Esket* still is—as far as we can tell—to Dondragmer's neighborhood. It seems to me that Kabremm's presence there is convincing evidence that Destigmet's crew has encountered and been captured by natives of Dhrawn. I don't know why Kabremm was free enough to meet that search party; maybe he escaped, but it's hard to see how he would have dared to try under the circumstances. More likely they sent him deliberately to make contact. I wish very much that you'd pass this idea along to Dondragmer for his opinion, and have him find out what he can from Kabremm—if *he* is still available. You haven't told me whether he was still with the search party or not. Will you do that?"

Several pieces fell into place in Ib Hoffman's mental jigsaw puzzle. His silent applause went unnoticed, even by Easy.

TO BE CONCLUDED

## IN TIMES TO COME

Next issue will, of course, bring the concluding installment of "Star Light," in which Barlennan's tangled web of attempted deceptions draws down into a fine tight knot. But the cover story will be "Lost Newton," by Stanley Schmidt.

Many years ago Willy Ley pointed out something that isn't quite as tautological as it sounds: "A prerequisite for life to start on a planet is that there be no already developed life forms there." Not by reason of definition of "start," but because when life forms exist on a planet, they'll consume any pool of energy-containing organic chemicals in which life might have started.

"Lost Newton" does a nice job of showing why a science couldn't get started—if there were, on the planet, someone with a high-order science already applying it!

Suppose you were trying to study the laws of fluid flow—and somebody had given you one of the modern thixotropic substances that was like molasses in January when you left it alone, but had the viscosity of water when you stirred it up a bit? Obviously, the faster a thing moves in a fluid, the less power it takes to propel it. Right. . . . ?

Now try and invent a sensible science!

A highly developed hot-shot science in existence can make fundamental discoveries impossible! ■ THE EDITOR

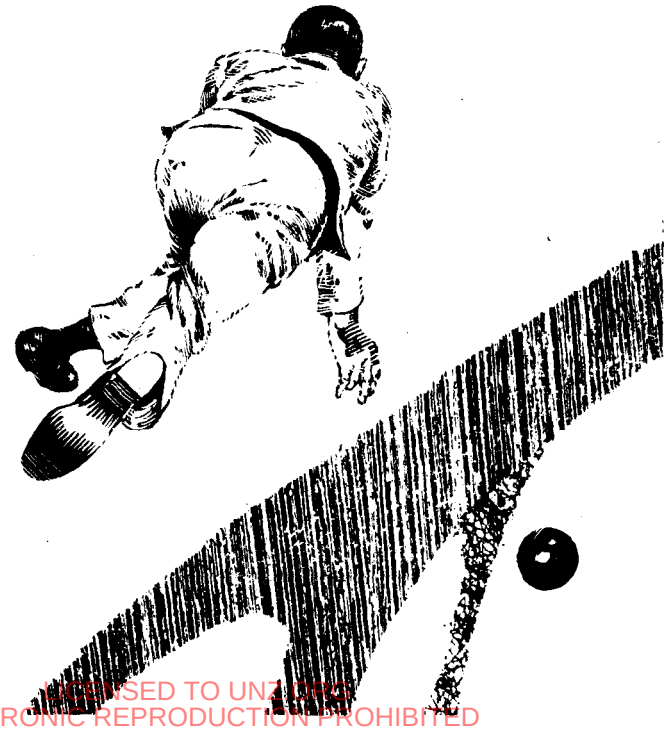


LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

*Colonel Ravenshaw*
*was having troubles with feminine crackpots—*
*and not all of them were even human!*

W. MACFARLANE

*Illustrated by Vincent di Fate*





LICENSED TO UNLOAD
ELECTRONIC REPRODUCTION PROHIBITED

Ravenshaw read the letter and put it aside. When he finished the rest of the mail, he read it again. The writer said he had developed a variable hypergolic reaction controlled by the carrier. He was an associate professor of Geochemistry at Sonoma State. His BA and Masters were from Michigan and his PhD from Colorado School of Mines. He had met Fabio Marquien, who mentioned Ravenshaw as a man of integrity, skilled in the commercial exploitation of discoveries.

"Got a letter from a guy named Nelsover Felkins," said Ravenshaw on the phone. "What do you know about him?"

Marquien said, "He's got all the brains there are. There's only one thing wrong with the clown. He's crazy. He worked for Dow in



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Michigan and quit because of napalm. He worked for Shell on geothermal chemistry over in Imperial County, and went down south of Calexico for the Mexican government. Do you know they have about forty steam wells there? Eight-inch holes, because they can't handle the pressure from anything bigger. They had a consortorium of experts from Italy, Japan, New Zealand and Iceland—all over. I ran liaison. They didn't like Felkins, and he didn't like them. He got a job with some school up north."

"What sort of man is he?"

"Bright and beady-eyed. On his own time he wears a toga and Jesus boots. He's a chameleon type and I bet he wears tweeds and a pipe at this school. He's got a fashionable social conscience so long as it doesn't interfere with what he wants to do. He is never wrong. It was somebody else's fault. He's dingbat. Don't trust him."

"Fabio, could he come up with something good?"

"Yes, he could. But you'll get his pearl of wisdom out of the middle of a piano wire spiderweb. Tell you what, Arleigh, go over to the zoo and rent a skunk. Kick him in the kiester. You'll get just as good a reaction, and you can bury your clothes and forget about it."

"O.K., 'Mano. Thanks. Do I owe you a dinner for this?"

"You buy the beer when we fly down to Baja, down into *mañana* land." He pronounced *mañana* to rhyme with banana. "Bahia de los Angeles, Mulege, La Paz." The music rolled off his tongue.

"Hang easy on that. I'm going up to San Francisco to see this Nelsover Felkins. Should be back tonight, but—"

"My sincere condolences. Well, give me a honk on the ameche whether you go or no."

"I will give a hoot," said Ravenshaw, who shared Marquien's amusement with elderly slang. "Many thanks."

Ravenshaw tapped the letter on the desk and phoned Sonoma State. After switching around to various departments, he spoke with an intense girl who said Dr. Felkins could not be disturbed because he had a lecture. Ravenshaw asked if she could deliver a message. She brought back a request that Ravenshaw meet Felkins at five that afternoon at his houseboat in Sausalito.

Ravenshaw called PSA and got a reservation on the one o'clock flight. He began looking for the book of travelers checks he kept in his desk. Then he looked in the filing cabinet and was sitting on the floor with his legs apart, going through the bottom drawer when his secretary tapped and came in.

"A drop-in wants to see you. His name is Paughpucker," said Nell Rowley.

"I'm looking for little sausals."

"It's a switch," she said agree-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ably. "Don't ask a question and get a silly answer."

Ravenshaw got to his feet and pushed in the drawer. "For the first time in my life, I wondered what Sausalito was the diminutive of. Show in Mr. Paughpucker."

"I'm going out for a cup of coffee. My electric perker quit. Answer the phone." She ran her tongue along the inside of her lower lip. "I'm going to take my umbrella. It's getting incoherent around here this morning."

Posnor Paughpucker bellied into the office. He handed Ravenshaw a card. His high damp forehead was narrow and his jowls sagged. His shoulders were narrow but he had to wriggle before he sank into the ample client's chair. He was built from the blueprints for a pear.

"It's not fair, Mr. Rabblesnaw," he said. "I've been in business for twenty-eight years next November. This outfit has the gall to open a drop next to me. Who runs it? A girl. A bitty Mexichit from high school. You know what they charge? They charge $5 for anything you bring in yourself. If it takes two people to carry it, they charge $10. If they pick it up, they charge $15. Is that honest? I tell you, Mr. Rapplesaw, it's not!"

Nell was right. It was an incoherent day. Ravenshaw felt he was leading a life of quiet desperation. What was he doing here, listening to this fellow? In quick revulsion, he saw himself as no better than the indignant man across the desk. Maybe he should put on a lampshade for a hat and sit in the lobby of the U. S. Grant Hotel and do his celebrated imitation of Queen Victoria's first encounter with the new-fangled water closet.

The old man had not stopped talking. He was sweating earnestly, his yellow curls plastered to his pink skull. "—Little decal they stick on every job. 'Tampering Voids Lifetime Guarantee,' that's what it says. Imagine! I know what parts cost, forget labor. At carload discounts they couldn't come out. There are dozens of manufacturers. They got hundreds of parts that change with every model. So you take off the back panel to see how they fixed it, and what you got? You got brown blah! Mr. Robinsnore, here's one of their fliers: TLC Permanent Repairs. You people at Better Business Bureau have got to do something about it!" He slapped the badly printed fold-over on the desk.

Ravenshaw said, "We're not the Better Business Bureau." He glanced at the flier. "We're not even the Good Business Bureau."

Paughpucker struggled to his feet. Ravenshaw asked Nell to find him the address of the BBB. When he had gone, still flustered with embarrassment, Ravenshaw sat gloomily at his desk and asked Nell about the other appointments.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Ditchwater dull," she said. "You have a hammer man, a total environment for babies woman, a shredded tweet inventor, a modular construction enthusiast, all in the afternoon. The auditor can come at your convenience, and you're scheduled for a long evening with Kenneth Goad, that visiting fireman from Philadelphia. I think he wants you to quit WBY and go to work for Lyne Jolley. From a worm to a butterfly, so to speak." She looked at him closely. "This metamorphosis will be encouraged by a laying on of the long green?"

"You want to come tonight and hold my hand?"

"There's iron in your voice, Lieutenant Colonel Ravenshaw."

"There's dry ice in yours, Nell Rowley."

She sighed. "How can you be so good with other people?" Her mouth drooped and Ravenshaw's heart was in his throat. And so bad with me, she implied.

He understood the trouble well enough. If he put out his hand to this woman, she would start with the fingers and eat him alive. Her lipstick was a dreadful pink color, her dress an amazing green and her lovely palomino hair wisped over her collar. A real mess, thought Ravenshaw, and swallowed silently.

"I suppose the hammer man invented a combination," he said in a level voice. "Hammer, screwdriver, pliers, can opener, awl and rachet drill?"

"A stapler and some other things. Patent applied for."

"The woman wants to put baby in a box with controlled temperature, air strainer and closed circuit TV?"

"It lights a light and rings a bell when baby wets."

"O.K., what else? What's shredded tweet?"

"A fruit grower. A farm engineer. He's bringing prints of a vacuum device. The bird is attracted to a tray of birdseed and the weight on the perch actuates a mechanism that sucks it into a macerator. It is chewed up and dried and used for fertilizer. The analysis is great, he says, and it's self-cleaning."

"Oh boy, I hate to miss that. Mod construction—well, maybe the man invented a brick. The auditor can wait. Ken Goad is staying at Bahia. I'll give him a ring. Can you handle the rest of the people? Put them off until Monday if they have to see me. I'm going up to San Francisco." He handed her Nelsover Felkins' letter.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

She read it at a glance. "What's hypergolic?"

"Anything from rust to the lunar module's engine. Dictionary says, oh maybe, spontaneous combustion of complimentary substances."

Their eyes met. Both Ravenshaw and Nell stepped back from each other. Neither of them smiled. Sometimes they would go for weeks with never a ripple in the surface calm, then inadvertently the sky would be full of lightning.

"Down," said Nell in her high honey voice, "down, boy."

"You are my half orange," said Ravenshaw, and grinned. "I'll see you Monday. Have a nice weekend." She nodded curtly and walked out the door. Ravenshaw turned to the window overlooking San Diego Bay. *"Tu eres mi media naranja,"* he said wryly to a distant aircraft carrier, and went to look again for the travelers checks.

The girl plucked her lute. The hard, sweet notes drilled into Ravenshaw's ears. She leaned back against the cabin and closed her eyes. "Cu-ri-os-ity," she sang, "killed the cat. Diddle-dee-dat. Killed the cat." She was a small girl with shadowed blue eyes in a heart-shaped face.

The whole day had been incoherent, like spilling a dozen golf balls on top of Nob Hill. You could throw a coat over the first bounce and five minutes later, you'd have to walk for a week to pick up every ball. Ravenshaw had half-surrendered to the lunacy.

"What I need to know," he said, "is where he's at? Diddle-dee-dat. Where's he at?"

"Didn't your mother ever tell you it's impolite to ask questions?" She was using her little girl voice. She was about twenty, dressed in a man's blue shirt with the tails tied over her bare stomach, skin-tight Levis and scuffed ballet slippers on dirty bare feet.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Ravenshaw took off his jacket and slung it over his shoulder. San Francisco was bright as the promised land across the Bay, though late afternoon fog was building up behind the hills. It was hot and sultry and soft. "Bend my ear," he said. "Milton Caniff: 'As the ear is bent, so grows the know.' "

She opened her eyes and sang:

"What is takin' you so long to come?

Wherever are you at, my deary darlin' Deario?

I been sittin' here a-waitin' in the sun—

Sun go down, dark come on, you not come."

She looked up at him. Her eyes were unfocused. "All right," she said. "Bend down, old buddy." She whispered, tickling his ear with her soft breath. Her hair smelled slightly sour.

What she said was a venomous stream, a tumbling spate of filth. Each word was meticulously pronounced and devoid of any emotion. Her mouth was rectangular anguish when she stepped away. Then she dropped her eyes, smiled shyly, and picked up her lute again.

"You have the words," said Ravenshaw evenly, "but the melody needs more work."

She yawned. "Mark Twain to Olivia." She picked at the lute and crooned to herself. The random notes turned into "Greensleeves" and away again. The fog was towering over the Sausalito hills, blotting out the eucalyptus on the ridge. A diesel truck blattered on the highway. When the noise faded she sang:

"Disconsolate I wait while the sun wheel slow,

Dark here now, but I not go.

Wherever are you at, my deary darlin' Deario?

Night come now, but I not go."

Ravenshaw shivered, but not with cold. He leaned against the rail and decided it was a very nice houseboat. About forty feet long, pleasant blue and white fiberglass, husky service connections looped up to the dock, stanchions for an awning and no portholes. Big glass windows. He would be afraid to drive the thing across the bay, but if you liked the tule marshes and the winding channels of the Sacramento River, it might not be actively dangerous. Maybe not. Nowhere near as dangerous as this girl. He wondered what kind of drugs she was on.

"All right," she said, "just who the hell are you?"

"Name's Ravenshaw. I work for an outfit called WBY. Wide Blue Yonder. Our business is ideas."

"Our-business-is-ideas," she mimicked. "The hell with 'em. Nobody, but nobody can think and be creative. Cheapest thing in the world, ideas. Any idiot's got 'em."

"So I'm head winnower."

"Chief chaff-driver-offer? What's chaff and what's not?"



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Well, you could call WBY the research and development arm of sixteen small companies. Let's say you get a red-hot idea like sending words along a wire—"

"I know. 'Mr. Watson, come here, I want you—' "

" 'What hath God wrought?' "

"—And you sell the idea to the Bell Telephone Company. You know, you're going to need an awfully long wire to talk with Nels. He was great communicator, a master of the weasel word. What we need around here is less jibberjabber and more honest communication. Never trust anyone over thirty months old. Sometimes they talk sooner. Don't trust them either."

She struggled in her tight Levis for a flat aspirin tin. She took a pill from it and popped it into her mouth. Ravenshaw waited.

"D'ya know," she said solemnly, "I've been raped by ideas. It is criminal lunacy to think." She took another pill. "I got acute misology, which means I mistrust reason, for the best reasons." The fog was halfway down the slope by now and the street lights suddenly went on. "The sacred temple of the mind o'erthrown," she muttered.

"What's your name?" asked Ravenshaw.

"I am Mary Jane Felkins. My home is Rapid City, South Dakota." She turned her toes in and her mouth was curiously prim. "I am a senior in Biophysics at Leland Stanford Junior University. My father is a dentist. My mother is a housewife. I am a National Merit scholar. Nelsover Felkins is my uncle. He is downstairs in the basement of this here boat. In the tub."

She became a gracious hostess. "Would you like to see him? It's really quite interesting, Mr. Watson. The hypergolic solution is the closest thing ever to a universal solvent. It can be modified by the carrying agent. Or diluted. Or neutralized. My uncle, Dr. Nelsover Felkins, has introduced me to many things of interest. Yes, indeedy. Yes, he has. Oh, you bet your sweet elbow—"

"Hypergolic?" said Ravenshaw softly.

"He believes the solution will be an admirable addition to our military-industrial know-how. One fascinating illustration he used was that of a skin diver with a putty gun filled with his invention. Of a grease consistency. In Hanoi harbor. He assures me, Mr. Watson, that all the diver need do is draw a large circle on the bottom of a ship. Or a star, if you choose. Or an oval, or a square, or a pentagon—"

"Mary Jane!" Ravenshaw interrupted.

"And the bottom will drop out. Is that not a charming notion?" Her voice dropped a register. "Is that not a charming idea, Mr. Watson?"

"Yes. Let's go see your uncle."



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Certainly, Mr. Watson. Right this way."

She veered and pirouetted gravely as she walked to the door. She turned on the light and they went down the stairs. It was a bright room with a breakfast counter and kitchen in one corner. There was a door in the far bulkhead leading to the bedrooms and a bath. There were bookshelves with nautical fiddles to keep the books from spilling in a chop. The refrigerator started humming. There was a plain galvanized washtub in the center of the room. Copper wire had been carefully wound around the tub. It was hooked up to an electric train transformer, which also hummed.

A man was standing in the tub. He was dressed in brown tweeds. His tie was neatly knotted. A pipe bowl stuck out of his breast pocket. There was a loop of manila line just under his chin that ran to a double sheave pulley hung on a hook in the ceiling. Four lines ran to another pulley five feet off the deck and the end of the line was tied to the chromium leg of a fixed table.

He was standing in the tub, but the liquid was well over his waist. The tub could not be more than twelve inches deep. Closer to ten, thought Ravenshaw, and about twenty-four inches in diameter. A trickle of blood had dried on his cheek from a contusion on his temple.

"Time to dip uncle a little more," said Mary Jane. She fumbled with the knot at the table leg. "Not such a heavy now," she commented as the ropes crawled over the sheaves. Uncle steamed as he went in another four inches. It was pale orange steam. He looked as though he was resting with his elbows over the edge of a well. "He's just melting away," said Mary Jane. She was observing, not praising or complaining.

"Um . . . careful with that knot," said Ravenshaw. The liquid had an oily sheen. It smelled like old movie film burning in a pig pen.

She yanked the line carelessly and uncle dropped another inch. She turned to Ravenshaw and her eyes were mad. "Mr. Watson, do you know what this incestuous monster did? He sold out to the war mongers. So I reasoned with him. I reasoned him good with a piece of pipe. And soon, his earthy husk dissolved, he will be one with the seraphim and the cherubim—I think they both have wings in their ears, but I'm not sure."

She stood and did a staggering dance step toward Ravenshaw, her arms crossed on her breast, her hands flapping under her ears. She tripped on the cord and pulled the transformer plug out of the socket. She fell. Ravenshaw grabbed her and was halfway up the stairs before he turned.

From a hundred tiny pinholes,



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the liquid pierced the galvanized tub. Thick orange smoke rose from the carpet. As he watched, the bottom seam ruptured. Virulent smoke blotted out the body of the man, cut off just at the sternum.

On deck with the doors shut, Mary Jane coughed and said, "You are too impetuous! Unhand me, Mr. Watson—what would Mr. Bell say?"

"Heads up," said Ravenshaw, and hit her on the point of the chin. He put his shoulder into her stomach and grabbed an arm and leg. A fireman's carry is hard on the victim's stomach, but easiest for the fireman. He jumped to the dock as the houseboat lurched under him. He walked over the plank deck and up the ramp to shore. There was a phone booth at the edge of the parking lot. He propped Mary Jane against it and fished for a dime.

"Oberador," he said with a thumb and forefinger pinching his nose. "I godda girl here. She's odda trib. A bad trib. Gedda doctor. Tell the cobs. Bad trib." He hung up and wiped the handset with his handkerchief.

He walked the two blocks to his rented car, vomited tidily down a storm drain, blew his nose and wiped his eyes, and drove away. He stopped near the kiosk in Sausalito and made a credit-card call to New Glatz, Maryland.

'May Craddock here. Oh yes, Arleigh. Billy's gone for some bicarb. They served us bullshots—canned consomme with vodka. The tape? Wait-wait—here he is now."

Ravenshaw told of his activities. "—Somebody ought to pick up Felkins' papers at Sonoma State, check safe deposits and hollow trees and friends and relatives. The houseboat went down with the lights burning and orange smoke bubbling up. No explosion. The lights went out. Ought to be guarded until they raise it. General, that man had something, besides a crazy niece."

"Serendipity is what you've got," said General Craddock. "I'll have a man to meet your plane in San Diego for debriefing. Then it's out of your hands. So you never really met Felkins?"

"I . . . you could say I met him halfway. Good night, sir."

Back at his car, Ravenshaw opened the door and brought up bitter bile. Then he got in and drove across Golden Gate Bridge and through the city to the airport.

Some months before, Ravenshaw had been sitting with General Craddock in New Glatz, Maryland, on the glassed-in lanai of the general's converted farmhouse. "There's a motto tattooed on my heart," Ravenshaw said owlishly, " 'Man Is A Problem-Making Animal.' Tattooed underneath in smaller letters is 'Kill Your Own Dog.' "



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The general pushed his glasses onto the top of his head. "You make 'em, you solve 'em. Have another gin tonic." He was watching the heavy flakes of late spring snow tumbling white in the garden floodlights.

"All I know about you, sir," said Ravenshaw, "is that you work in the bowels of the Pentagon. It's kind of a problem. You have no title on your door. You have enough clout to yank me out of Vietnam and put me into a job no table of organization ever listed. You have access to unvouchered funds." He sipped his drink. "My mother thought bowels very important, sir."

"Do you know what they called me when I was military attaché in Cape Town more years ago than I care to remember?" The general pulled down his glasses. "Not the natives, but the wisecracker sergeant who did the work? I'll tell you what he called me. Old-man-who-can-see-through-the-hole-in-a-Cheerio. What do you think about that?"

"You have a thing about spectacles, sir."

"No use for them!" The general lifted the dark plastic covers on his glasses. "Have a ceremony, have a show, have a spectacle. I'll tell you who gets the work done, Ravenshaw. The quiet, dedicated, sneaky fellow. The Gray Eminence. The brain behind the silent arrow in the night. Welcome to the club."

Ravenshaw shrugged. "A problem in an emotional concept," he said. "You do something about it, or you don't. After a while, it goes away."

The general put one eyeshade down. "Let me precis the situation," he said. "You were my choice to head an investigation of inexplicable phenomena, a choice confirmed by my tame psychologists and by events. Within six months you have stirred up this can of worms until all those little eyes are looking at me." He put the other shade down. "You found an alien artifact, an alien to go with it—and he went—a mishmash of speculation about an infinity of worlds, and within twenty-four hours no evidence remains. This is no fault of yours. Your secretary stands in some relationship to these alien worlds. Have another gin tonic."

May Craddock walked onto the lanai. She turned off the outside lights. "Chow down," she said. It was black and very quiet outside. "With all this boy talk and sozzling, it's blotter time." The two men exchanged glances. They were both stone-cold sober. Each had attempted to draw the other, and the contest—Ravenshaw decided later—was a draw.

Blotter time. Time to assimilate events.

Ravenshaw flew down the length of Baja, California, the next day



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

with Fabio Marquien. They got the 210 Cessna stuck in the blow sand on the strip at San Felipe and a taxi driver rounded up all the boys he could carry to push the plane back to firm ground. They had lunch at Mulege, green with jungle growth between the bitter desert and the bitter sea. Marquien went off about his business that night in La Paz and Ravenshaw slept under a sheet with the tropical night wind stirring through the full jalousied doors. If the heads of the great dead fish at Bahia de los Angeles reminded him of a houseboat in Sausalito, the houseboat was sunk and overlaid with incident. Ravenshaw decided that involvement was the answer to queasiness. You do not worry about problems on a roller coaster of events.

On Monday morning he walked down the gray marble corridor to his office without his stereotyped thought that it was like the entry to an icy hell rather than a hot one. He was pleased that he arrived before Nell. Some weeks before they had engaged in an unspoken competition that had stopped only when they arrived simultaneously at 6:00 a.m., laughed and had breakfast together, and stopped such foolishness. Nell Rowley was a behavioral psychologist acting as his secretary for her own reasons. He was a lieutenant colonel in the U.S. Army, relieved of his command in Vietnam to be chief of WBY. Except with each other, they were formidably competent grown-up people.

At half past nine he phoned her apartment. No answer. At ten he phoned the apartment owner, a tough old biddy named Fanny Powis. At ten thirty he phoned Jim Stenhouse of the San Diego police, who said he would check the blotter and the hospitals. At eleven he phoned Fabio Marquien and got his answering service, and Marquien called from Tijuana fifteen minutes later. He said he was in the mayor's office and would set the wheels in motion for all Baja, California del Norte. Where else could she be? Any place in the world since Friday morning, when he had seen her last. Or—in any of the other worlds?

". . . I have the sheriff working, too, on the back country," Ravenshaw wound up his report to General Craddock.

"Busy day so far?"

"I saw three-four people between phone calls. Nothing special." He knew the general's interest in specifics and indulged it. "There was a folding lifeboat man, a fellow with a game so complicated he had thirty-eight pages of instructions, a woman with a wrinkled pin—like a wrinkled paperclip—and let's see. Oh, yes. A guy wanted to package eggs. One of the big food companies tried it and the housewife wouldn't buy neat little trays of shelled eggs in plastic. Nothing



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

very wild, nothing blue, nothing at all yonder."

"Do you want me to send another secretary?" asked the general. "She's got to have clearance—"

"For folding boats? Let me struggle along, sir. For all I know, Nell had a hair appointment and forgot to tell anybody about it. She's an unortho-doxy for sure. If she's a Mier, maybe she recovered her memory and took off on a broom."

"Ravenshaw, do you believe all that stuff you told me happened in the desert?" the general wheedled, "The Drishna, the Mier, the shim worlds?"

"No, I don't believe it, sir. It just happened."

"Um-ah, what is your relationship with Nell?"

"Relationship? Hell, General, we don't even have a folding boat. I'll get hold of a Kelly girl until Nell turns up."

"Would you like Rosely Dool for a week? She's in LA running up some fancy statistics at XDS—Xerox Data Systems— on a prototype of their new Sigma series."

"General, it's not that important—"

"In a pig's valise, Colonel Ravenshaw. There's an informed body of opinion in this city that wants to know what kind of toothpaste you use. I spend half my time keeping them off your back. There are three laboratory contracts out to investigate iodine, just because of the story you told. What in the ruddy-bloody hell do you think happens when I deliver a genuine, no malarky, alien artifact? They want another one."

"Sir . . . I had no idea . . . I thought—"

"Ravenshaw, you can fall into a cesspool and come out smelling like a rose. It's a special talent. It's not that you're shot with luck. You don't necessarily get what you want, but in some screwed-up way you find out things this country needs to know about. The motto tattooed on *my* heart is 'God Protects Babies, Drunks and the United States of America.' Think of me as the right hand of God in the USA department. Don't tell me what's important and what's not!" There was a tinkling smash 2,300 miles away.

"Busted your glasses?"

"Got another pair. Now listen. Telling you this isn't going to affect things, according to my tame psychologists. You got something they call a stability index. They chart you right off the scale, so keep on doing what you're doing."

"Yes, sir. I think all psychologists are crazy, and I think you are something of a—"

"I don't give a rap"—there was another tinkling crash—"what you think about psychologists. Just keep bumbling along."

"Glasses?" A growling noise was interrupted by a snap. "Ear



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

pieces?" No answer. "Well, it's nice to know somebody cares. I'll look around for Nell myself. Maybe she said to hell with it and signed on as a topless dancer at the Body Shop."

"E-r-r-Ravenshaw. Keep in mind that behavioral psychologists are a dime-a-dozen. I am concerned with your peculiar ability. Regard yourself as a goose who lays the golden eggs and act accordingly. Take care."

"Yes, sir," said Ravenshaw. He hung up the phone. "Honk-honk," he said experimentally.

He had an appointment in the early afternoon with a gangling columnist from the San Diego *Union*. Ravenshaw entertained the man with an account of the growing number of people who worried about invisible rays. All the radio waves and TV programs and X rays were causing the weather to change and turning nice boys and girls into hippies. It was important that the public be aware of WBY as a serious organization, and Ravenshaw mentioned Jay Hardinge, whose method of three-dimensional cartography had attracted the interest of the Coast & Geodetic Survey. Ravenshaw regretted that his *cucarachita* was off today and he had to hold down the fort. The columnist said he would take a raincheck on the drink and went to buy his own.

Ravenshaw searched Nell's desk with a feeling of violation, though the only personal items he turned up were a few bobbie pins, a vile-colored lipstick and a comb. At the back of the folders in one of her files he found a Kleenex box neatly taped for strength, containing a miscellaneous assortment of junk.

There was a water-worn piece of abalone shell, chatera—broken pre-Columbian pottery faces—from Tlaxcala, Fabio Marquien had given her, a paper of thumbtacks, a strip of passport pictures he had thrown away—he looked like a hulking oaf—the TLC flier advertising the repair of household gadgets, a few pretty stones from the Borrego desert, a broken gold chain, a note he had written to "Cucarachita—my little cockroach," and a book of matches from a restaurant where they'd eaten after working late. "Other items too numerous to mention," said Ravenshaw aloud, hot with embarrassment. He put everything back carefully, told the answering service he would check in when he got home, and left the office.

Nell's apartment was in a scroll-saw gothic house on the edge of an arroyo off Front Street. Ravenshaw parked his car, admired the diamond-cut shingling and walked over to the woman standing beside the motorcycle. She had a toothpick in the corner of her mouth and wore a black sweater, black pants and black boots. She looked at him thoughtfully.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Afternoon, Mrs. Powis," said Ravenshaw. "Have you seen Nell?"

"Nope." Her voice was pea gravel, hard but not big.

"My name's Ravenshaw. We met a couple of months ago."

"E-yup." She put on a black leather jacket and zipped the sleeves tight.

"We work together," said Ravenshaw patiently. "She didn't come to the office this morning. Do you know where she is?"

"Nope." She put on a pink crash helmet with golden flecks. It had a large chin strap of pink leather.

"She didn't leave a note, or phone, or anything?"

"If you're a police dog, show me your badge." She adjusted the elastic carrier straps holding down a sketch pad and a flat tongue-and-groove box.

"Pastels?" asked Ravenshaw, and was gratified when she shifted the toothpick to the other side of her mouth.

"There's a mudflat down by National City. About ten minutes after sunset. Watercolor now. Couldn't handle pastel."

"Ever do your house? Can't remember a steamboat gothic in better condition."

Without a change of expression she unhooked the straps and opened the sketchbook on the hood of his car. Ravenshaw whistled softly. She was a magnificent draftsman.

"AB Frost, or Dan Beard—seventy years out of your time, ma'm," he said with real respect. "I can't draw water myself, but if I had my druthers, I druther be able to draw than anything else. What are you messing around with watercolor for?"

"Who wants to do what they can do?"

"May I look?" She nodded and he leafed through the book. "Holy sweet Christopher," murmured Ravenshaw in honest admiration of a drawing of an old stamp mill and overthrown mining machinery near Julian. There were dozens of sketches, the weary face of a fry cook, a broken automobile wheel with flowers through the wooden spokes, a bravura drawing of a squatter's house on the Tijuana flats, a stately Twin-Six Packard next to a juke box 1958 Oldsmobile, and on the last used page, a quick impression of a running girl with a coffeepot in her hand, the electric cord flying behind.

"I'd like to buy that," said Ravenshaw soberly.

Fanny Powis considered him. "She said you'd steal a bone from a blind dog. Said you're irreverent—you'd laugh at your own funeral. You're devious as a basketful of snakes. Your heart's as black as a pickled walnut. You've got her interest, all right."

She broke the sheet out of the book and gave it to Ravenshaw. She strapped the pad onto the car-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

rier. "I haven't seen her since Friday evening myself." She eased onto the motorcycle, kicked the starter, turned the key and kicked it to burbling life. She moved the toothpick to the other side of her mouth. "Too bad you're not twenty years older, Ravenshaw," she said, and wheeled away down the street.

While she did not look like a toad on a fireplug, Ravenshaw already felt twenty years older. He wondered whatever happened to the old-fashioned neighborhood girl, dainty and sweet and demure as a Spode teacup full of gin. This was a time to try men's souls, but then it was always something: National Swiss Cheese Week or Take a Friend to Dinner Day. For him, it was Meet a Crazy Lady Week. And old Paughpucker said that the TLC drop was run by a high-school girl.

Tender Loving Care. TLC Repairs. If Nell had missed her morning coffee because the electric percolator died, and if Fanny Powis had caught that lovely figure running—to catch a bus?—then the last place she'd been was TLC Repairs. Ravenshaw decided he had not been awfully bright. He opened the door of his car and froze.

TLC *Permanent* Repairs. Tampering Voids *Lifetime* Guarantee. Inside his mouth up under his ear, just as if he had swallowed an aspirin without water, was the sudden intuition that he had not been paying attention. What if—just maybe—they weren't fooling?

He drove to a telephone booth beside a gas station. There was no listing for TLC in the yellow pages, but he found Paughpucker's Appliance Service listed with a nearby Hillcrest address. The TLC shop was next door with a homemade sign in the window, and he drove around the block to park the car.

"Is this the Five-Ten-Fifteen Dollar store?" he asked the girl. The shop was bare, except for a left-over counter with a cash register and rough shelving against the walls filled with toasters, mixers, hair dryers and other appliances. There was a pickle jar by the register with a sign, "San Ignacio Relief Fund," and he dropped a quarter in the slot. The girl nodded shyly.

"My wife left an electric percolator here Friday and lost the ticket. She's a gold-blonde and she was wearing a bright green dress. Remember her?"

"Yes, sir. She was in the bookstore across the street afterwards. Mr. Smith says you have to have a ticket."

"Golly, Princess, what am I going to do?"

"If you could wait a little—Mr. Smith brings back the old and takes the new to be fixed."

"Where does he fix them?"

"Down Rosecrans from Old Town somewhere. It takes twenty-four hours in all and satisfaction is . . . ah, here he is now."



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

A white panel delivery double-parked in front of the shop. One of the men who got out was a big Mexican, the other a little whip-cord man with a sandy goatee and hot blue eyes. The girl told him the problem and he nodded. "Pero-pero, you load those things," he said to the Mexican. "My name's Omar Smith. What kind of percolator was it?"

"Damned if I know," said Ravenshaw. "The name's Rowley. Isn't that it over there?" He pointed to the only coffee maker on the shelves. The girl handed the ticket to Smith, who asked his wife's first name and handed him the pot with a smirk of self-satisfaction. Ravenshaw examined the percolator. "Hey, didn't there used to be some slits around the base?" he asked. "Where the cord plugs in, kind of. Are you sure this thing is fixed?"

"We don't fool around," said Smith firmly. "If you see our label on it, it's fixed good and for good. Our experts re-engineer the mechanism if necessary. We fix something, it stays fixed."

"I got a color TV that's acting up. I think it might be the picture tube," added Ravenshaw.

"We'll fix it for our standard price . . . you about done, Pero-pero?"

"How can you do it, Mr. Smith," Ravenshaw persisted. "Fella told me the color tube alone runs one hundred five dollars wholesale."

"That's why I'm in the repair business and you are not. Let's keep it that way, shall we? Ernestina, take the gentleman's money. And a good evening to you, sir."

Fiesty little devil, thought Ravenshaw as he walked to the corner and then ran to his car. Because of the one-way streets, it took forever to get back to the TLC shop. The white van was gone. Away down the street a white panel turned onto Washington. The evening traffic was heavy and it was not in sight when Ravenshaw made the same turn. He drove circumspectly because a black and white patrol car was ahead of him. After the longest two miles he had ever driven, Ravenshaw turned onto the freeway and drove at eighty to the Rosecrans turnoff. Then he dawdled behind an old man enjoying the evening air. Caught by the stoplight on Old Pacific Highway, he saw the van again under the concrete maze of the freeway overpass. It was well after sunset and the turn indicator blinked before he lost sight of his quarry. When the light was green again, the van was gone.

Ravenshaw crossed the intersection and turned off onto a side street. It was a freeway disrupted area of warehouses, small industry and a few homes left over from fifty years ago. He almost missed the cobble-front bungalow with the stucco garage to the side. The yard



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

was a wilderness of junk and old plantings. There were three antennas at least fifty feet tall. A stout six-foot woven wire fence surrounded the property. The white van was backed to the garage. Ravenshaw made a U-turn at the dead end by a sandwich factory, and drove slowly back along the street.

Pero-pero was unloading the van. A handsome Doberman Pincher ranged the fence. The last light gleamed on the dog's rippling muscles and his smooth chain collar. Ravenshaw drove on to Rosecrans and parked his car at a Golden Piute service station selling cut-rate gasoline. "Expert Mechanic On Duty," said a big sign. He took the percolator with him and walked into the shop at the side of the station. A boy with a hollow chest and long hair was seating valves in a little engine on a low work bench.

"Cute as a bug's ear," said Ravenshaw, admiring the red painted little four-banger with its aluminum transmission. The boy told him it was a Morris Minor, and while a Volks might be a little more satisfactory they still cost too much, and the Morris Minor was such a pretty little thing that he had buyers in a line for all the dune buggies he could turn out.

Ravenshaw explained that he wanted to see the insides of the percolator and the boy said "Why not?" He took it to a bench under fluorescents and looked it over carefully. "They can't do this," he said. There was no way to take the bottom off, no screws, no bolts, no slip rings. "How did they make it?"

"Dunno," said Ravenshaw with satisfaction. "Let's take a hacksaw and find out." The saw went easily through the chrome and thin steel, but made no impression at all on the brown material underneath. "Pop off the shell with a chisel," said Ravenshaw.

"It's seen its last cup of coffee." With the body ravaged away, there was only a disk of brown plastic left. "Beats the hell out of me," said the boy. "Torch?"

"I got a feeling it won't do the job," and it didn't. "Beat it with a hammer." The hammer bounced. They tried a sledge. Still no result.

"I got a twenty-ton jack," said the boy.

"What have you got to jack against?"

The boy grinned and took a worklight outside to an old grease pit. When they got the jack arranged crossways to the pit with blocks of tough Douglas fir, the blob of brown material still proved resistant. The boy suggested a ball bearing to concentrate the pressure, and with that lashup, they finally cracked the mystery. The thing broke to dust. Ravenshaw handed up the jack and the dented wood from the bottom of the pit. "What do I owe you?"

"Shop time is eight dollars an hour, but it's my time. Would fifty



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

cents be too much for gas, and wear and tear?"

Ravenshaw dusted himself off. "I need a couple of things. About five feet of stiff wire and a can of starter fluid. I got this balky old dog."

"Yes, sir. I got a roll of ten-oh concrete tie wire."

"Great." Ravenshaw bent the wire double, made a loop at one end and a hook at the other. He took the can of ether, which judiciously applied will revive a corpse when sprayed down the carburetor, and handed the boy a ten-dollar bill. "If you bring any change, you'll have to fight me."

"All right," said the boy. "You bring in another of those things to look at, and I'll fight you before I take any pay."

Ravenshaw handed him a card. "I've been thinking a long time about a car. A sort of sleeper. Something an old lady in tennis shoes might drive, but I want engine and suspension and brakes that'll let me go like a striped ape. If you'd like to make something like that, give me a ring and a price."

"Strict stocker outside? Let me think on it."

Ravenshaw climbed back into his car and drove off. He stopped at a drugstore and bought a roll of tape. He drove past the cobblestone bungalow and parked between two sandwich delivery trucks. It was dark and a light fog was drifting in from the bay.

"Point of no return," he said to the steering wheel, "just like the birdmen say." He rolled up the windows and locked the car. He took the seal off the spray can of ether and gave it a squirt. "I wonder if man can ever do what the birds do?" he asked the side mirror. There was nothing built on this earth that would not at least be marked by a hacksaw, an oxyacetylene torch or a sledge. That brown stuff had been a lump of inexplicable phenomena.

"Daddy, what can birds do that men can't do?" He was dead sure that hot-eyed Omar Smith and Pero-pero would not be cooperative. "Sit on a bob-wire fence, my boy," he answered absently and walked down the street, keeping to the shadows.

Ravenshaw became especially wary after he subdued the dog. He was suspicious about smooth operations. The animal was not a barker and its growl was low keyed, but sincere. The white teeth reflected the far street light, glimmering in an honest desire for closer acquaintance. It followed him faithfully along the fence. The wire hook was too big to fit through the chain links, but there was clearance between the gate post and the gate. He slipped the hook through and let it lie on the ground. The dog was suspicious,



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

but more interested in following him as he walked away. He returned to the gate with his faithful friend, hooked the collar and fogged the dog with ether.

Four-foot drive gave the dog first-class traction. It struggled frantically. With its head held tight against the fence, the dog sneezed twice, growled sleepily and slumped to the ground. Ravenshaw timed the spray to the animal's breathing and climbed the fence at the corner. He dragged the dog by a front paw to a clump of overgrown castor-bean bushes, taped the muzzle and then the feet.

The yard was a hostile environment because of abandoned stoves and washing machines and refrigerators, and especially the antenna guy wires tied to axles pounded into the ground. The ruins of a coffin-nose Mack truck were in a far corner under a scraggly pepper tree and the artifacts were older and piled higher in that direction.

A door in the side of the garage suddenly opened, spilling light into the yard. Ravenshaw sank behind a deepfreeze as Omar Smith came out, followed by Pero-pero. "We'll have a beer and a bite while we're waiting. Maybe she's made supper," said Smith over his shoulder.

"What happens?" asked the big Mexican. "We put things in the box and they go like magic."

"You make cerveza go like magic," said Smith. "Come on, Pero-pero, I'm hungry."

They went into the house by the back door. Ravenshaw slipped into the garage. There were dusty TV sets stacked on top of each other against a wall. The workbench at the far end of the garage was littered with testing equipment and tools. There was an old-fashioned oval mirror standing in front of a partly disassembled TV chassis. A stack of wiring diagrams and parts catalogs had slumped disregarded against a case of oil. In the center of the bench was a cobbled two by four frame about five feet square, with dull black velvet on the back side. At the right of the frame was a jerry-built nightmare of electronic components. To Ravenshaw's uneducated eye, it looked like a collision between an Atwater Kent and a Sony, with tall glass tubes glowing and colored wires running around condensors banded like hornets. Red and green jewel lights were bright and an amber bulb blinked lazily.

The shop smelled of new lumber. The center of the floor was occupied by a platform three feet high with two by eight steps facing the door. A trestle of two by fours ran directly to the bench. Inch ID black iron pipe was fixed to the top of parallel edge-up two by fours and a homemade car sat on the rails. The wheels were coaster wheels with the rubber tires off, mounted on bar stock turned down at the ends, and brackets supported a sheet of weathered one-inch ma-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

rine plywood, which made the floor of the car. It was four by eight feet with clumsy plywood sides, so improbable a construction that Ravenshaw climbed the platform to look at it more closely.

Two hundred watt bulbs hung from the rafters and he saw a gleaming gold thread at the front of the car. It creaked when he climbed aboard. He was on his knees, and had decided the fine copper wire would make good hair for a brass lady robot, when he looked out the open end of the car.

Omar Smith was jumping like a mad toy monkey. When he saw Ravenshaw look up, he shrilled, "Give it a shove, Pero-pero!"

"But-but—" said Ravenshaw, translating the Mexican's name to English.

Pero-pero shoved the car and it trundled down the track. Ravenshaw stood and grabbed a rafter. The car rumbled on out from under him. He dropped to the track and waited for the smash at the bench. He faced the two men, ready to jump to either side of the rail. When the noise vanished, he turned in surprise and Pero-pero was on him.

It is always disconcerting to a tall man when he meets a professional basketball player. Ravenshaw thought of himself as moderately husky, but Pero-pero plucked him from the track like a banana. It was humiliating.

"Heave-ho!" shouted Smith.

Ravenshaw lashed out wildly, but Pero-pero had him by the collar and the slack of his pants. With an effortless sweep he tossed Ravenshaw into the black velvet behind the frame on the bench. Smith was hooting with laughter when all sound cut off.

He hit water. He whipped an arm in front of his face as momentum threw him forward. He squashed his nose sideways and snorted horrifically in a black slurry of mud and goo. He splashed to his feet, finding an oozy bottom about ankle deep. The mud in his mouth had a salty taste and his damaged nose informed him of marshy smells. He took a few steps and scooped the surface to wash his face.

Hills loomed ahead, darker black against a dark sky. Frogs croaked somewhere in the distance. There was no artificial light, not so much as a candle's wink. There was only the mild stink of disturbed tidal flats, no smell of industry, gasoline, perfumery or cooking. Ravenshaw waded toward the hills and blundered into waist-deep water, lost his footing and floundered across a channel to mud and vegetation. It was stupid to grope through the dark. He should stay where he was until he could see. To hell with caution. He lunged across another channel and finally waded ashore through swamp grass edged with breadknife blades.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The shore was littered with cobbles and nondescript bushes. There were trees off to his left front. He trudged inland and found the San Diego River about where it ought to be. He stumbled through willows and waded up the shallow stream until he found a pool. He washed off the worst of the mud and tidal stink. He climbed a gravel bank and sat on a hillock covered with dry grass. He poured water out of his shoes. The frog chorus resumed.

There was no need to inventory his pockets. He was no key fetishist, so he had apartment, office and car keys only. He had a few coins, wallet, handkerchief, wristwatch and pen. He always carried a four inch, three-bladed stock knife. He was wearing bluchers, sport coat, slacks, shirt and nubby silk tie. Not ideal equipment for the Robinson Crusoe business.

Ravenshaw had long ago given up persuading himself into appropriate sentiments. It seemed reasonable to worry about his situation, but all he really wanted was a length of two by four and Peropero handy. Would it be more satisfactory to hit him broadside, or stick the end into his gut? He would pound Omar Smith into the ground like a tent stake.

A coyote barked up Mission Valley—*yap-yap-yurr*—or a herd of coyotes, so there would be game, rabbits and squirrels and birds. Fish in the stream, shellfish and abalone and lobster on the coast. He had no matches, but he could make fire by the bow method. He had done it often as a boy, looping a cord once around a hardwood spindle, spinning it back and forth with the bow until a coal caught in the powdered dust of the softwood in which it turned. No problem.

The weather seemed standard for this time of year. The fog bank stayed off the coast by day and rolled in every night. He could not read his watch in the dark—he thought luminous dials dangerous—but it should be a little after ten. Comfortably oriented in time and space, Ravenshaw shivered in his wet clothes. He stood and flapped his arms. He began to walk himself warm, finding a comparatively open area against the hills to the south. No eucalyptus on the hills. That fitted. They were an Australian import.

If this was the world where household appliances were repaired, he had been shunted away from the shops instantaneously. The little green men who fixed toasters wanted nothing to do with him. They must be pretty sophisticated to reject him at the entry point. Using a brown blob as a heating element was a little tricky, too. He had not looked at the thermostat on the pot to see if—but his premise had been proven. Would the shop be in Los Angeles? It seemed unlikely. If this was not a shim world—one of the infinity of



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

worlds—someone had picked up San Diego and put it elsewhere. He was walking along Highway 80, eight lanes of concrete, but there were no cars and no concrete. His stomach was clapping against his backbone, but there was nothing he could do about that, either. He climbed the hill on weary legs, out of the cold air drainage, and dug into the up side of a live oak. The leaves were prickly and dusty. He refused to think about Nell.

He dozed the interminable night away and woke at the first light. He was stiff and sore as a runny nose and hungry enough to eat a fried sea gull. He walked to the river without shattering and got a drink of water. It sloshed in his stomach. When it was light enough to see, he missed the first six rabbits with rocks and only thumped the ribs of the seventh. He made a sling of his tie and practiced. In the next series of shots he knocked a rabbit ears over tail. He stepped on the head, pulled it off and peeled the skin. He gutted the rabbit and wondered how it would taste raw.

"That is rabbit 247867993," said a high, honey voice.

Ravenshaw spun around, looking for Nell. That was her voice, light, clear and sweet. No one was near him.

"Do you have a match?" asked Ravenshaw. "A gasoline stove and a pressure cooker would be nice." There was no answer. "Carrots and potatoes, salt and butter and pepper would help." This statement might seem ambiguous. "I want to eat this rabbit," he announced. "Please cook it for me."

The rabbit was tugged from his hand and disappeared. He scrubbed his hands with sand at the edge of the river. He had no objection to getting dirty, but he disliked staying that way. His clothes were still damp and he hoped the sun would break through the morning overcast early. He was walking beside the stream when a rattlesnake appeared. It was coiled to strike. Ravenshaw stepped sideways.

"That is rattlesnake 248006548," said the voice. "On your other side is rattlesnake 248006474."

There was a boulder handy, about three feet high, and Ravenshaw stood on it. He was introduced to a number of rattlers and was just as well pleased when the voice stopped. There were a couple of dozen on the ground and every time one attempted to go away, it was nudged back by an invisible—hand?

His wife had been dead nine years now and he had almost forgotten her everyday appearance; he would never forget the senior class picnic at Tassafaranda High when she picked up a rattlesnake by the tail and cracked its neck like a whip. She had been very quick with her hands, had Cay Sandler. By inclination and opportunity, she had been raised a tomboy.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"You don't know the meaning of the word discretion," murmured Miss Abbott, their imperturbable class advisor. "Maybe not, but I can spell it," said Cay with her black eyes sparkling, "F-e-e-r." Imperturbable Miss Abbott had laughed aloud.

"Where's my rabbit?" asked Ravenshaw. "Our implicit contract was that you return it to me cooked, and cooked well with a fresh salad on the side and a few potatoes and a cup of coffee."

"There is no contract."

"Intent is the important thing. If your intent was deceit, chicanery and double dealing, I am damaged by the loss of my rabbit. If it is beyond your capacity to cook the rabbit, return it to me. If you don't know how, I'll tell you."

The rattlesnakes disappeared with a noise like kernels of corn popping. In their place appeared as many startled coyotes. Two cowered on the ground, another pair skulked toward a bush and the rest bounced away, only to be returned to the vicinity of the boulder snarling and snapping.

"Animals get irrational when pushed beyond their understanding," observed Ravenshaw. "Then the panic gear is engaged and the result is freedom—or death." The coyotes paid no attention to him and suited their behavior to their individual natures, some running in a circle, others pacing back and forth, and one creature seriously engaged in scratching himself.

They disappeared like popped balloons and were replaced by bears, brown, cinnamon and black, the color variations of the native black bear. They all snuffled and thought things over. A few stood up to get a better smell. A mother cuffed her cub. A good sized cinnamon beast decided to go elsewhere and was returned to the vicinity of the rock. He was puzzled rather than angry, and Ravenshaw was glad the grabbag had not included a short-fuze grizzly.

Cinnamon stood up and sniffed. He lumbered toward Ravenshaw. He stood up again. While bears have very handsome and well-engineered heads, the design does not leave a lot of room for brains. The beast dropped to all fours, began to rumble and rock from side to side. "Where is my rabbit?" roared Ravenshaw. Cinnamon did a back somersault, blinked rapidly and licked his nose. "Cut out this stupid zoo!" he bellowed. "Where's my food? I need fuel!"

He and the bears vanished at the same instant.

The potatoes were small and yellow with a dense waxy texture. The salad was made with the tips of an unfamiliar succulent, miners lettuce, and small, thick-skinned and seedy tomato slices. The rabbit was boiled with salt and native sage for seasoning. All western hemisphere, Ravenshaw noted, and primitive.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The meal was served in three stainless steel bowls—the type sold with mixers—and a tined spoon was the only eating instrument provided. Ravenshaw thought this tool might be made from first principles, and wondered if the sharp edge on the right was intentional because he was right handed, or if it was fortuitous.

Because he was eating yesterday's supper and a delayed breakfast, and because he had serious reservations about the intentions of his host, Ravenshaw did not waste time. He stoked himself, sitting on the floor, leaning against the wall. The room was a white cube with nothing in it. There were no seams, no differentiation between the walls and floors and ceiling. There was no hairline crack for a door. Ventilation was excellent. The structure had no source of illumination, yet he cast a shadow, as if the cube had been carved from the middle of a sunny day. He ignored this observation as beyond his control or explanation, just as gooney birds ignore airplanes on Midway.

"My compliments to the chef," he said when he put the last bone into a mixing bowl. "Quite a civilized meal for a world without a man on it." He spoke positively, as if he knew what he was talking about. "Is coffee available?"

"No," said the clear voice.

Western hemisphere again. "Some ice water, please."

A bowl of water appeared beside him. The ice was a perfect ball. Ravenshaw sipped and thought it was from a Sierra glacier. Now he was in no hurry. He felt like a fish in a barrel. If his assumptions were correct, there was a shotgun over the barrel, any amount of boiling water, and a bottle of iodine such as old ladies used to pour into goldfish bowls to make the goldfish shine.

"Well, a machine," he said, "is never wrong."

Halfway through the sentence he was standing on his boulder in Mission Valley with the sun burning through the overcast, but when he finished, he was back in the white cube again.

"Of course that's pretty obvious," he went on. "All a machine can do is what it's built to do. You can't condemn a toaster for not being able to make ice cubes. If an element burns out, the machine is still not wrong. It does what it must do—and you are the same."

"What am I?"

Ravenshaw exulted. Here was response. He was no longer simply being acted upon. Carefully, now. "I think I know what you are," he said, "but your haphazard experiments with an involuntary guest make me question your motives."

"My imperative is the acquisition of information."

"A button collector," said Ravenshaw. "How sad. There is nothing more dangerous than a collec-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tion of facts. A lot of learning is just as intoxicating as a little learning. Alexander Pope recommended drinking yourself sober at the Pierian Spring, but that was a source of poetic inspiration, not the smarts."

"You cite unknown references."

Ravenshaw was off and running. "Anybody can number rabbits or count grasshoppers. The grains of sand on a beach are finite, but where does pointless curiosity lead? Nothing is more futile than a compulsive encyclopedist."

"I do not follow your conceptual sequence."

"Knowledge does not exist in a vacuum. Does anyone hear a tree fall in a forest with no ears? Knowledge is an evaluative process that builds to wisdom." Ravenshaw spewed slippery ideas as a boy shoots watermelon seeds. "Wisdom requires value judgments based on the three denominators common to all sentient life. If any of the three are not satisfied, the entity dies."

"Forests do not have ears. You are illogical."

"Judgment is the imperative term and decision is implicit, with, or without, overt action. The proof lies in your eagerness to repair household articles. Logic may operate on levels closed to your apperception. Are the Mier logical?"

"The Mier are not susceptible to examination. Intrusive intelligence is the concern of my compeers."

"Pass the buck," sneered Ravenshaw. "Avoid responsibility. If you and your buddies are programmed that way, I can't expect you to make ice cubes. A machine is never wrong, but if I'm pigeonholed as an intrusive intelligence, where are they?"

"Observing other areas. My compeers and I have not communicated for three hundred eighty-five years. We are observers. Our compilator destroyed itself."

"I'll bet I know why," said Ravenshaw. "Sheer boredom. And to survive, you are evolving from a fact accumulator to something different."

"We have observed this planet for thirty-eight thousand two hundred fifty-six years. The term of our mission was ten years. The cause of the delay is not known. I have changed my appearance since your world made inadvertent contact and I confirmed. Now that I am correcting malfunctions of your devices, I have enlarged my capacity."

"Let me see your new appearance."

For an answer, the wall across from him turned dark and stars appeared around a golden ball suspended in space. The view zoomed closer and the ball was patterned with shifting points of brilliant color. "You are very lovely," said Ravenshaw.

"Do you think so?" The voice was clear honey, and Ravenshaw



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

was caught in a wild surmise. "I have maintained my observation of the two continental land masses and added to my surveillance systems. I could have continued usage of the original material" (Was there diffidence in these words?) "but the color patterns are more interesting."

"Magnificent. And more suited to your personality."

The voice purred with pleasure. "Would you like to see my corrections space?"

"Indeed I would," said Ravenshaw, his suspicion strengthened that gender was infectious. With the compilator gone—whatever that was—this intelligence had adopted a female viewpoint, possibly from exposure to the Mier. A sexually neuter orientation was an unquestioned assumption about a machine, but Ravenshaw began to believe that this collector of facts was feminine.

The golden sphere faded from the wall and was replaced with a view so utterly strange that he was completely lost. If Miro had painted on a thousand sheets of air stacked one behind another, Ravenshaw could not have been more bewildered. He felt like a native of New Guinea in the middle of a beer-bottling plant. Things were happening all around, shapes were strange, sizes unknown, function incomprehensible.

A rectangular shape resolved itself into the battered plywood trolley and Ravenshaw had scale. The place was immense. It was not designed for human beings. There was no air space, no space for human bodies, no gravitational bias to one side or another. A waffle iron was moving to the plywood car by a route more intricate than a marble through a pinball machine. A television set swam into his field of vision.

"The intent of this device is not to bombard animal tissue with X rays," said the voice. "Am I correct?"

"An undesired side effect," said Ravenshaw.

"I am pleased you confirm my analysis. Now that we are better acquainted, we will proceed with our experiment."

"What experiment?"

"The corollary is exact. Men experiment with machines. My imperative requires that I experiment with man. It is possible that I will be able to improve you, but your physical quality must first be assessed."

Ravenshaw gulped. "What do you have in mind?"

"A physical examination of the organism as a whole, a thorough analysis of the components and rebuilding as necessary."

Ravenshaw spoke rapidly, "There are so many variables that all you'll learn is the response of one man with no application to all men." He laughed uneasily. "What a fallacious idea!"



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"One must work with the material at hand. If I do not learn about men, I will understand one man completely. Do you have any further comment before we proceed?"

"Yes, dammit, you're not correlating. By your nature, you must rationalize the facts you are given."

"Eighty-seven percent of my capacity is engaged in an examination of your prior statements. My surveillance systems are recording for later assimilation. We have an amplitude of time."

Ravenshaw said, "Let us consider the imperatives of sentient life I mentioned earlier. The first requirement is a sense of identity and I do not believe you are solid in this area. The second is the basic need for amusement, entertainment, variety. This is why you keep me here instead of returning me to my own world. The third is security. It is the least important, but still essential, and security depends on identity and variety before other considerations."

"I am devoting ninety-six percent of my capacity to these concepts."

"Then think of your relationship to your compeers. You are female and they are male. These attributes are antithetical and paradoxically the sum of the situation is larger than the parts—"

For the first time, the voice interrupted him. "I am now devoting eighteen percent of my capacity to my normal functions. Your presence is not required while I reassess the situation. What shall I do with you?"

"The simplest solution is always the most elegant," said Ravenshaw, "and elegance becomes you."

The transition was instantaneous.

Ravenshaw found himself sitting in the trolley in Omar Smith's garage, surrounded by household appliances. He jumped out, picked up a warped two by four and smashed the Atwater Kent-Sony installation on the bench. He pounded the chassis components to scrap metal and swept the debris to the floor.

The garage door opened. To Ravenshaw's great pleasure, Omar Smith and Pero-pero entered. He had no intention of behaving rationally. He had been running for his life over a nightmare railroad trestle, pursued by a high-wheel steam Pacific locomotive that whistled at him. He was going to pound on them like drums. He moved with what he hoped was a disarming smile on his face, the billet of wood loose in his hand as if he had forgotten it. Just a little closer now.

Nell Rowley stepped in front of the men.

"It's over," she said in her honey voice. "All Mr. Smith ever wanted was enough money to equip a small medical center at San Ignacio, back in the San Pedro Martirs from Puertecitos." Ravenshaw was as-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tounded that he had mistaken another voice for hers. "We have agreed to terms. Forty-five dollars for every receipt in the records of the TLC shop." Her color was lovely, her hair a mess.

Ravenshaw hefted the two by four and hesitated. He tossed it aside regretfully. "All right," he said.

". . . So Nell was there from Friday on," said Ravenshaw gloomily. "She grabbed a cab and walked in and wouldn't go away until she persuaded Smith to stop fooling with the unknown. His electronic lashup was with a one-of-a-kind tube Ernest O. Lawrence built years ago. Smith was doodling with it."

General Craddock studied his face. "I got a small army deployed in San Diego while you were flying here—" he began. "What's bothering you, Ravenshaw?"

"Nothing, sir. You want alien artifacts, you got alien artifacts. TLC was open for exactly sixteen days and there are one hundred eighty-two tickets for toasters, radios, refrigerators, eleven blenders, eight TVs, a dingus that heat-seals plastic bags, an electric typewriter, two adding machines, an 1850 Seth Thomas clock and a waffle iron." He slumped in his chair. "Are you going to swap new lamps for old?"

"No-no," said the general. "You have our brand name appliance in your home, madam? You are eligible for a color TV, or two weeks in Hawaii, or $500 cash. Answer the question and you get the prize. No obligation. We get the appliance. There are four big semis on the highway to San Diego from LA warehouses right now, staffed with the biggest TV consoles you ever saw."

"Who was the first president of the United States?"

"How many pounds of coffee are there in a two-pound can? Or what famous character drives reindeer and comes down the chimney on Christmas? Or Notre Dame is famous for badminton, football or basket weaving? Choose one." The general kept his hands on his desk. He didn't touch his glasses. "Ravenshaw, I am not convinced you were wise to destroy the link to a universal intelligence, a computer of vast power."

Ravenshaw stood up. "Sir, that thing was an independent entity with unknown cultural built-ins. I had to overload the bastich until her circuits squealed, and that was a one-shot possibility. No control is possible. Suppose I'm wrong. Maybe her compeers are female, too. How would you like a mad mechanical lady gorilla to stick her fingers in your business?"

"Or sit in judgment on mankind? Well, yes. If you put it that way. Court of inquiry dismissed. I constitute the sole authority." He took off his glasses and polished them. "How is Nell Rowley?"

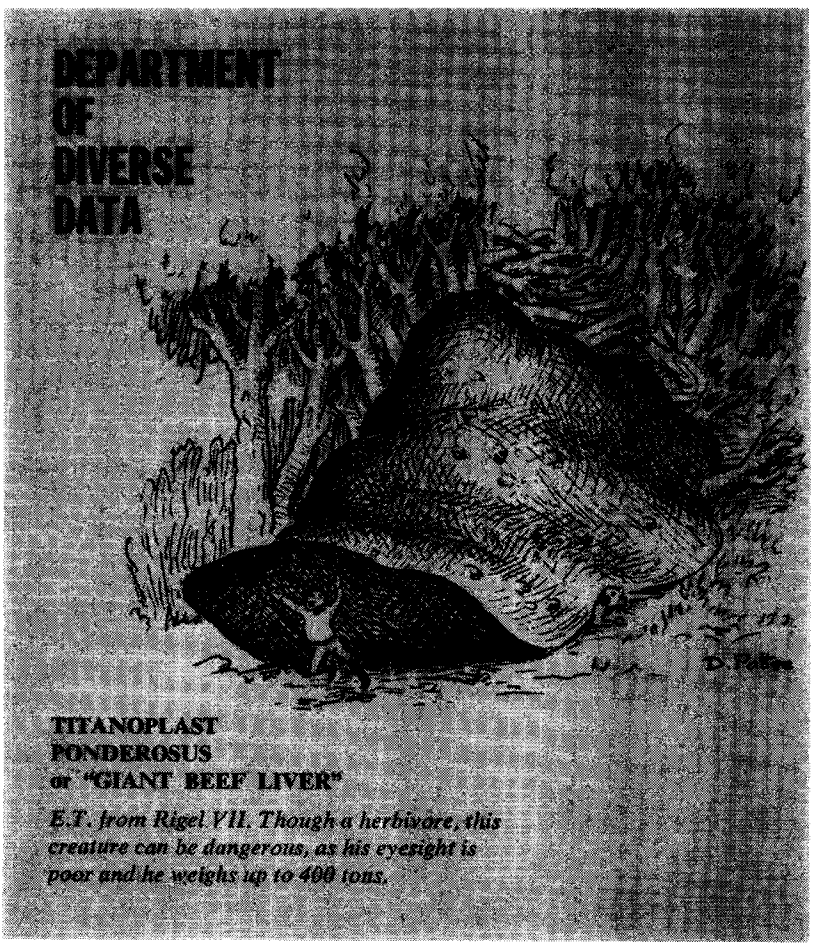


LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Speaking of lady gorillas?" Ravenshaw slumped into the chair. It had been a long old week, with too many women and too many moments of terror to enliven his dull life. "Well, sir, she was taking lessons in Spanish from Pero-pero. She wouldn't call me for fear I'd queer the deal. I complimented her on winning Omar Smith to our side, and I said she was the dove in my garden and the flower of my soul. Do you know what she answered? *La miel no se hiso para los burros.*"

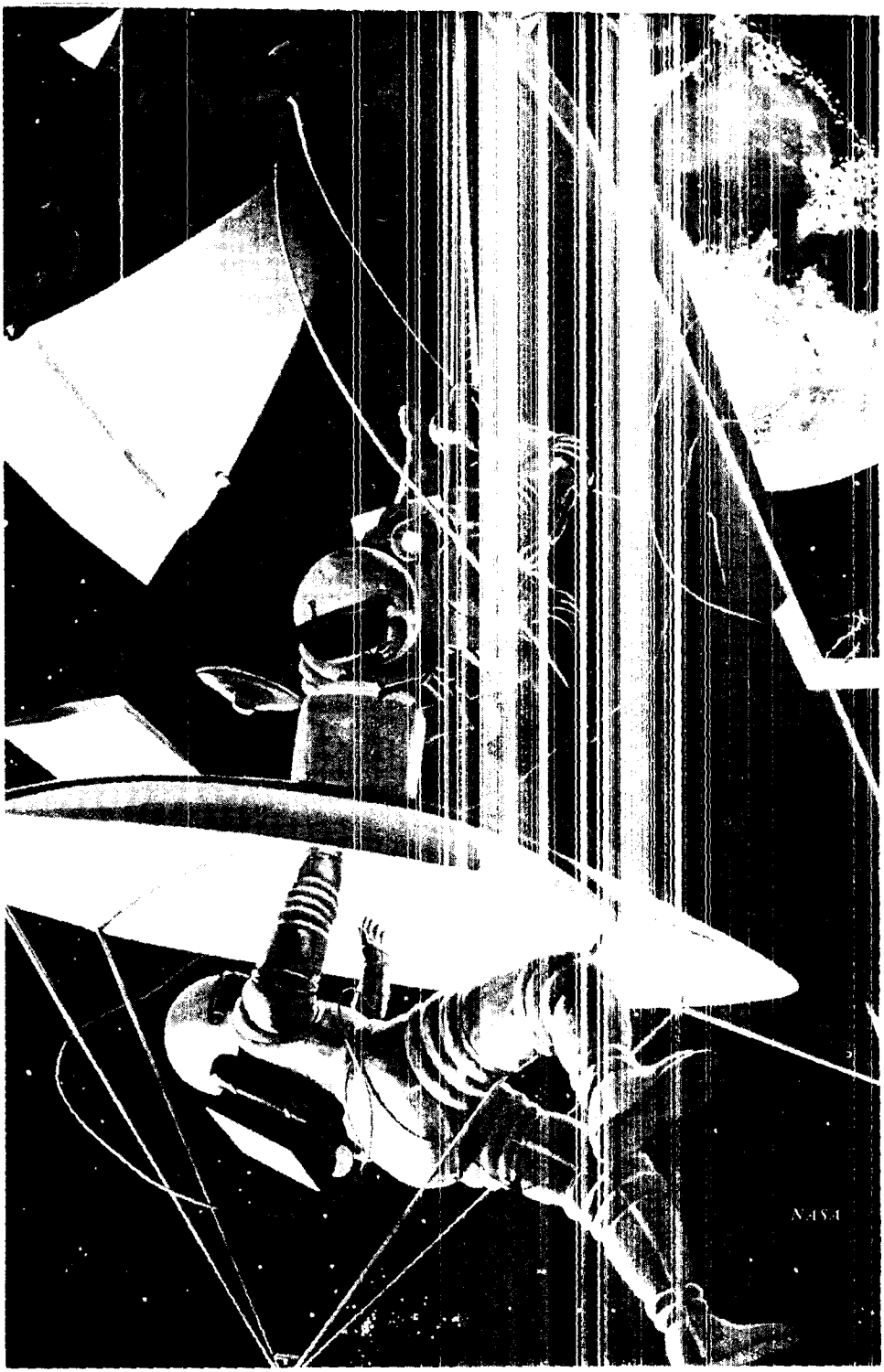
"Which means?"

"Damn it, sir. Honey is not made for burros." ■


DEPARTMENT OF DIVERSE DATA
TITANOPLAST PONDEROSUS or "GIANT BEEF LIVER"
E.T. from Rigel VII. Though a herbivore, this creature can be dangerous, as his eyesight is poor and he weighs up to 400 tons.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED




LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

*We've been discussing spacesuits for years—but now that NASA's had to build some, it turns out that the suit's not so much of a problem. It's what makes the suit livable!*

By WALTER B. HENDRICKSON JR.

# BACKPACK SPACECRAFT

During the final telecast of the Apollo 11 flight Astronaut Neil Armstrong took time to thank the builders of the spacecraft that had been used on the first Moon landing mission. These craft included "The little EMU, spacesuit, and backpack that was our small spacecraft out on the lunar surface."

This EMU, or Extravehicular Mobility Unit, and others like it are the latest product of a development program almost as long as that of the Apollo spacecraft itself. It, in turn, will lead to a still more advanced backpack spacecraft.

The first backpack was designed for use by Air Force astronauts on the Manned Orbital Laboratory (MOL). This backpack, which was called an Astronaut Maneuvering Unit (AMU), contained both a life-support system and twelve hydrogen peroxide thrusters with 2.3 pounds thrust each. These were controlled by a stabilization system, which could be either manual or automatic, so that the astronaut could steer himself through space as an independent spacecraft.

Work was begun on the AMU in June 1962. The MOL was not scheduled to be launched until 1971 so three AMUs were slated for tests in the National Aeronautics and Space Administration's (NASA) Gemini program. This required some redesigning of the AMU which had been planned solely as a backpack.

There wasn't room enough for the bulky 35-inch-high, 24-inch-wide and 17-inch-deep backpack in the cramped quarters of the pressurized cabin of the Gemini spacecraft. So a chestpack, about a quarter the size of the backpack, was designed by NASA. This unit included an emergency oxygen supply plus the gauges and warning lights for the AMU. It also coupled the astronaut to an umbilical cord which connected him with the Gemini's life support and communications systems.

This would provide the astronaut with additional life support until he could move to the adapter section at the rear of the Gemini where the backpack would be stored during

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

launch. Use of the AMU also required special chaps made of stainless steel fibers to protect the astronaut's spacesuit legs from the blast of the jets.

The development testing of the AMU was completed in early 1965. Two training units were then built for the astronauts to use in practice sessions. They used compressed nitrogen for propulsion instead of hydrogen peroxide. A number of failures that might occur during space flight could also be simulated with these training AMUs.

Three flight models were built for use on the Gemini 8, 9, and 12 flights. Originally it was planned to use these units with no connection to the spacecraft. However, when Astronaut Ed White was reluctant to return to Gemini 4 after the first American space walk, the flight surgeon thought he might have experienced the "split-off" phenomenon, a psychological reaction that makes jet pilots feel divorced from Earth. So as a safety precaution tethers were added to the planned AMU tests.

Of course the AMU, like all spacecraft, was equipped with many safety devices of its own as are the backpacks that followed it. All systems necessary for the astronaut's safety have backups, including a double set of earphones and microphones in the astronaut's helmet. Also gauges kept the astronaut posted on the amount of consumables, (oxygen, water, and hydrogen peroxide) remaining in the backpack. If any of these supplies ran low, or if another emergency occurred, warning lights would flash on the control panel and an alarm would sound in the astronaut's earphones.

The opportunity to test the AMU on the Gemini 8 flight, March 16, 1966, was lost when the spacecraft's Orbital Maneuvering System failed shortly after docking with an Agena target vehicle. To get the wildly gyrating spacecraft under control Astronauts Neil A. Armstrong and David R. Scott had to separate from the Agena and use Gemini 8's reentry maneuvering system.

This meant that they had to return to Earth on the next orbit, the sixth. As they headed back to Earth they left the adapter section of Gemini 8, with the backpack stored in it, behind in space.

So the first test of the AMU had to wait until the Gemini 9 mission. Astronaut Eugene Cernan climbed out of Gemini 9 at 10:00 a.m. EDT on June 5, 1966. He made his way along a railing to the rear of the Gemini. There he braced himself on a trapeze-like head and foot bar, and began strapping on the backpack.

This task proved considerably harder in space than it had been in the brief weightless moments of tests aboard aircraft flying missile-like paths. This was partly because



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

in the plane Cernan had had several minutes to rest while the plane was pulling out of its dive and starting another climb.

After the flight Cernan explained, "I had a position problem trying to keep my feet in the stirrups while using both hands to get into the AMU backpack. I continually floated out of the pack and had to work continuously against a pressure suit. This overpowered the environmental control system in the chestpack which removed moisture from the suit. I was devoting fifty percent of my work load just to maintain position."

There were two arms on the backpack which Cernan had to swing down into place. The right arm would allow him to control the direction he was facing in space. With it he could cause the backpack to spin him around, put him through cartwheels or somersaults, after he had moved away from the Gemini 9.

The left arm gave Cernan controls for traveling forward, backward, up, or down. It also had a switch for selecting manual or automatic stabilization and a volume control for voice communications. This volume control proved not to be too much help in talking with Cernan's partner, Tom Stafford, in the cabin of Gemini 9. With the bulk of the spacecraft between them, these communications were becoming quite garbled.

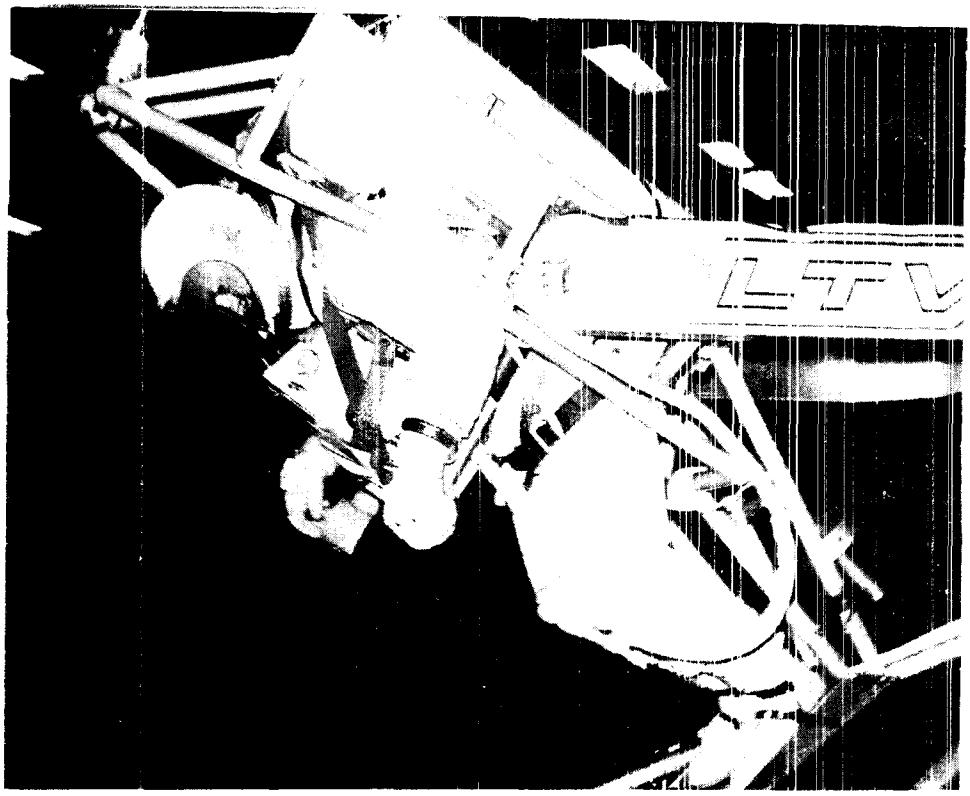
The exertion of readying the backpack for use caused Cernan to perspire heavily. Just as he switched on the AMU's life-support system Cernan's visor fogged up. He switched back to the umbilical line until his visor cleared, but when he again tried the backpack the fogging reappeared. The backpack could not handle the fogging problem so the test of the AMU had to be abandoned.

After the fogging difficulty was reported, many skin divers told NASA that they had had similar fogging troubles with their swim masks. They suggested that the astronauts try several compounds that they had developed to keep their visors clear. Some of these compounds were used on later Gemini flights with good success. Improvements undoubtedly have also been made in the cooling system of the backpack so that it more efficiently can take care of the astronaut's perspiration.

When other astronauts also found difficulty in working outside their spacecraft the test of the backpack was dropped on the Gemini 12 flight. Instead, Astronaut Edwin Aldrin used only the chestpack of the AMU plus an umbilical line and a hand-held maneuvering unit, called a "zip gun" by the astronauts. Aldrin spent a record five and one-half hours outside Gemini 12 experimenting with various means of positioning himself in space. These exercises proved that a



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



*Ling-Temco-Vought, Inc.*

man can work in space if some means is provided to keep his body in one place.

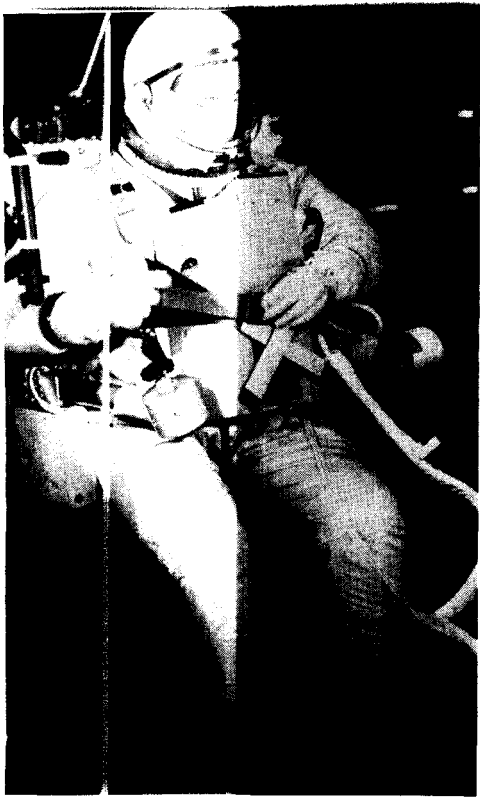
This knowledge was put to good use on the next space walk performed on the Apollo 9 mission by Astronaut Russell L. Schweickart. The purpose of Schweickart's space walk was to test the EMU—the backpack designed for use on the surface of the Moon.

Schweickart was also to demonstrate the use of the backpack to transfer along a railing from the front porch of the lunar module, called Spider on this mission, to the command module, named Gumdrop on Apollo 9. A team of astronauts returning from the Moon would use this route if the tunnel connecting the two spacecraft was blocked.

Plans for this transfer were dropped, however, when Astronaut Schweickart suffered motion sickness the day before his space walk. Instead, Schweickart only climbed out on the front porch of the Spider. Since EMU has no stabilization system of its own Schweickart used a pair of footholds, called "Golden Slippers" by the astronauts, to keep himself in place. These slippers were among the de-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



*Left. James B. Griffin of LTV Aerospace Corporation, subsidiary of Ling-Temco-Vought, Inc., begins somersault maneuver in tests of Astronaut Maneuvering Unit aboard easy-moving air-bearing platform which simulates in part frictionless conditions of space. The AMU, developed by the company's Astronautics Division for the Air Force, is scheduled for advanced "space walk" activities during Gemini 9 flight in 1966. In platform tests, Griffin was able to maneuver and halt as desired using unit's propulsion and automatic stabilization system. Containing systems like those in full-size space vehicle, the AMU converts spacesuited astronaut into miniature spacecraft for performing tasks outside parent vehicle.*

*Right. Major Edward G. Givens, Air Force project officer, straps himself into Astronaut Maneuvering Unit backpack during practice runs to check out and don the unit at the Dallas plant of LTV Aerospace Corporation. The AMU, which converts spacesuited astronaut into world's smallest spacecraft, is scheduled for advanced "space walk" activities during Gemini 9 flight in 1966. Here, unit is mounted in mockup of Gemini adapter section where it will ride into space before astronaut begins extravehicular maneuvers. LTV developed AMU for the Air Force, agency in charge of Department of Defense Experiment D-12 in the Gemini program.*

ice by Astronaut Cernan on C .

D s somewhat curtailed spac Astronaut Schweickart fitted the handrail in place on the front of the Spider and took several pictures. After some forty minutes outside the Spider Schweickart crawled back through the hatch completing the first test of the EMU.

This was also the first time an astronaut had walked in space without an umbilical line. Schweickart received his entire life support from the EMU. All that connected him to the Spider was a



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

rope tether. Of course, even this connection was dispensed with on the explorations of the Moon's surface.

Since it lacks a thruster system, which is not needed on the Moon, the EMU is about a third smaller than the AMU. The control arms have also been dispensed with in favor of a small control box mounted just below the collar of the astronaut's spacesuit. This makes the EMU easier for the astronaut to don than the older backpack. Another advantage is that the EMU is stored inside the cabin of the LM so the astronauts can help each other into their backpacks.

Like the AMU, the EMU is made up of two units. In this case they are the Portable Life Support System (PLSS, pronounced Pliss), and a smaller Oxygen Purge System. Normally the Oxygen Purge System is mounted atop the PLSS, but it can also be worn in front of the spacesuit.

Basically, the Oxygen Purge System is an emergency oxygen supply. It contains two two-pound bottles of gaseous oxygen pressurized to 5,880 pounds per square inch (PSI). This is a thirty-minute supply giving the astronaut time to climb back into the LM if anything goes wrong with the PLSS. It would also serve as a life-support system for an outside transfer from the LM to the command module. (The PLSS is left behind on the Moon's surface to save weight during lunar lift-off.)

To avoid any danger from a failure in the short umbilical line which connects the backpack to the spacesuit separate ones are used for the PLSS and the oxygen purge system. The PLSS umbilical loops under the astronaut's left arm, and the oxygen purge system umbilical passes under his right arm. Both connect to the spacesuit just above the astronaut's waist. These couplings are protected by a cover of teflon-coated Betal cloth like the outer layer of the spacesuit.

The portable Life Support System provides a more sophisticated oxygen supply than the oxygen purge system. It also circulates water through the astronaut's water-cooled underwear. By cleansing the oxygen and recirculating it the PLSS can provide life support for up to four hours.

A gauge on the backpack control box keeps the astronaut posted on how much Extravehicular Activity (EVA) time he has left. For another Moon walk the astronaut can refill the .92 pound oxygen tank from the lunar module. He may also replace the PLSS's batteries at this time. On later missions a small four-wheeled scooter, called a Lunar Rover, may be included. This would carry extra oxygen and batteries for extended Moon exploration.

The oxygen is stored in the PLSS as a gas under 900 psi pres-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sure. A centrifugal fan, powered by electricity from the PLSS's storage batteries, supplies oxygen to the astronaut at the rate of six cubic feet per minute. This gives the astronaut the normal, for our spacecraft, pressure of 3.5 psi pure oxygen.

The astronaut's exhaled breath and perspiration are returned to the PLSS where the impurities are removed. A canister of lithium hydroxide removes the carbon dioxide, and a filter of activated charcoal clears out other dust and contaminating gases. Before being recirculated the air is passed through a water-sublimating—extracting—heat exchanger for cooling. Some oxygen is lost in this process so it is replaced from the tank, and the cycle begins again.

The same heat exchanger serves as a cooler for the water that controls the spacesuit's temperature. An electric pump circulates this water through a network of tubes in the astronaut's under garment. Then the water, warmed by body heat, is passed through the heat exchanger. A valve on the backpack control box allows the astronaut to adjust the water temperature between 45° and 85° F.

The heat from the oxygen and cooling water is carried off by water evaporating from the heat exchanger. This evaporation is quite rapid since the boiling point of water in the hard vacuum which exists in space is −150°C., or −242° F. Of course, enough water is provided for a four-hour Moon walk. For a longer stay the astronauts would have to refill their heat exchangers from fuel cells either on the Lunar Module or on a Lunar Rover. These fuel cells produce an ample supply of water in the process of generating electricity by combining liquid hydrogen and oxygen to produce electricity.

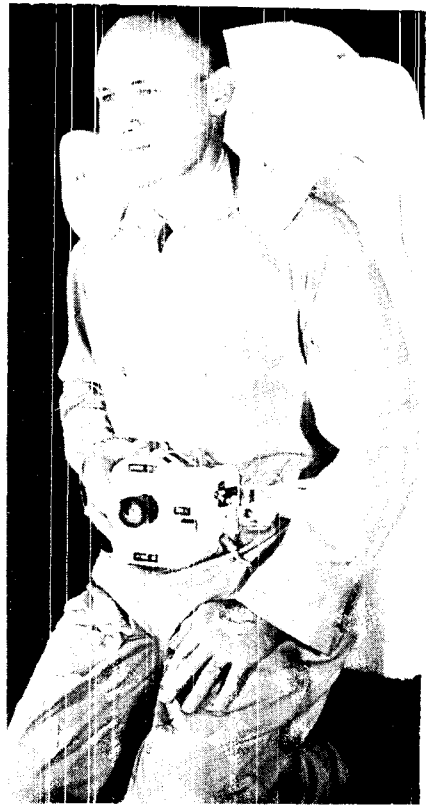
With the sun beating down on the Moon at a temperature of 250° F. it would seem obvious why an astronaut needs a cooling system. However, the spacesuit's insulation keeps all but about six degrees of heat per hour from seeping into the suit. About this much heat is lost in the same length of time on the shady side where the temperature is −250° F.

The real heat problem comes from the astronaut's own body heat, about 98.6° F. Ordinarily, man's own efficient cooling system, his perspiration, carries off this heat. But when he is sealed up inside a snug spacesuit there is no way for this heat to escape and as the astronaut works in space his body heat increases.

This human furnace generates quite a bit of heat. Even at rest it is about 100 watts and when the astronaut is hard at work—as he would be either on the Moon or during a space walk—the output can go up to around 750 watts. Obviously some means is needed to



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Ling-Temco-Vought, Inc.

*Left.*
*Original design for Astronaut Maneuvering Unit (AMU).*

*Right.*
*Astronaut Charles A. Bassett II visited Ling-Temco-Vought November 17, 1965 for his first look at the Air Force Astronaut Maneuvering Unit backpack he was to use the next year in the Gemini 9 flight to maneuver outside his spacecraft in orbit. Bassett was later killed in a plane crash. The AMU virtually converts an astronaut in a pressure suit into a one-man space vehicle for performing extravehicular tasks in space. With Bassett are Astronaut Eugene Cernan, GT-9 backup astronaut (right) and Major Edward Givens (center), AMU project officer for the Air Force. APOLLO 11 LUNAR LANDING SUIT—Suits to be worn by the two astronauts when they walk on the Lunar Surface.*

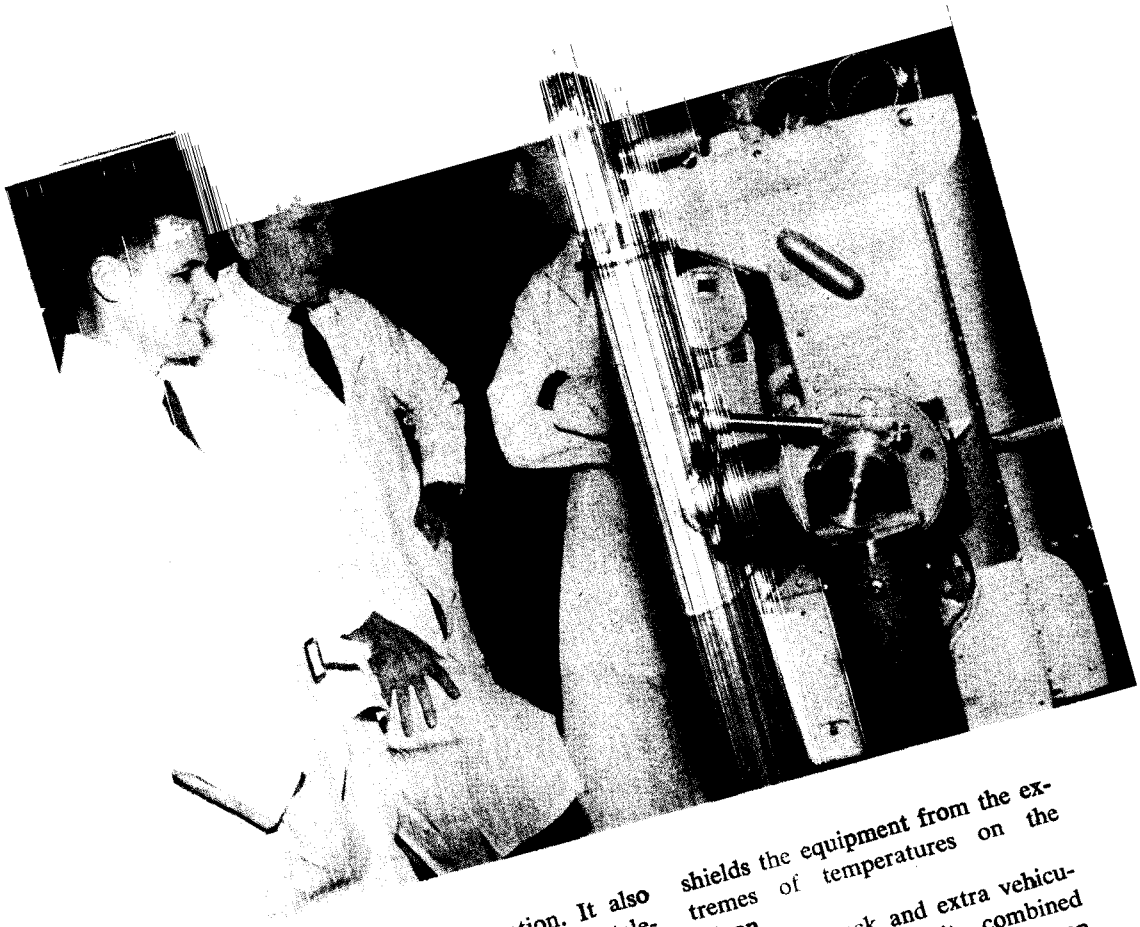
drain this heat out of the spacesuit.

Conventional air-conditioning is no help, of course, since it requires outside air to dump the heat into. Besides, it would be difficult to design an air-cooling system for the confines of a pressure suit anyway. So the water-cooled underwear is the best solution, so far, to keep the astronauts cool. This is actually a mechanical version of the body's own cooling system modified to fit the requirements of an astronaut sealed in a spacesuit.

The PLSS also contains a VHF radio that provides the astronaut



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



with voice communication. It also has channels that carry the telemetered reports from the physiological sensors on the astronaut's body. The antenna for this radio is mounted atop the Oxygen Purge System. It is an all-direction antenna so the VHF signals must be linked to Earth through the high-gain antenna on the lunar module. A similar dish antenna would be provided by the Lunar Rover for future extended Moon exploration.

A slip cover of cloth like the outer layer of the spacesuit serves as an insulator for the PLSS. This shields the equipment from the extremes of temperatures on the Moon.

The backpack and extra vehicular activity spacesuit combined weigh a total of 183 pounds on Earth. If it weren't that the Moon's gravity is only one sixth that of Earth an astronaut would have his work cut out for him just climbing down the ladder on the LM. Yet, even on the Moon the backpack weighs some 20 pounds. In order to keep their balance astronauts Armstrong and Aldrin found it best to lean slightly forward. Al-

*Backpack Spacecraft*



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

drin termed this the "tired ape" position.

The EMU was given its first extended test on the Apollo 11 Moon landing. Astronaut Armstrong spent some two hours and forty minutes outside the Eagle, and Aldrin spent two hours and fifteen minutes. The use of the backpack was extended nearly to its limits on the Apollo 12 mission. Astronauts Charles Conrad, Jr., and Alan L. Bean were scheduled to take two three and a half hour walks on the Moon. Between these walks they returned to their lunar module, Intrepid, to rest and replenish their backpacks.

The present EMU would be satisfactory for any lunar exploration either in the day or at night. Four hours is about as long as even the most adventurous astronaut would probably want to spend sealed up in a spacesuit. The backpack could be improved by making it smaller and lighter and adding a directional antenna, but none of these modifications are necessary for Moon walks.

When our astronauts again begin working outside their spacecraft in orbit, however, they will need some means of keeping themselves in position while they complete their tasks. This essential stability may be provided by the AMU, or an advanced version of it, and could be used in NASA's Orbital Workshop scheduled for launch in 1972. This space station will have plenty of room for the backpack to be carried inside the cabin where the astronauts can help each other into their equipment.

Besides the unused backpack portion of the Gemini 12 unit, NASA has one complete AMU left. It was built as a backup for the Gemini program. Also, Ling-Temco-Vought, makers of the backpack, delivered several AMUs to the Air Force on August 11, 1965, for the MOL program. Since the MOL has been canceled these units might be transferred to NASA, as have been many of the MOL's experiments.

Some modifications would be needed in the Gemini AMUs, and Apollo backpacks, if they are to be used on the Orbital Workshop. This is because NASA is planning to convert to a two-gas atmosphere of 69% oxygen and 31% nitrogen at five pounds per square inch on month-long flights, like those of the Orbital Workshop. Physicians have warned of serious physical damage from exposure to pure oxygen for such a long time.

The backpack must provide this same two-gas atmosphere and pressure. Otherwise, the astronaut would have to undergo a slow decompression to acclimatize him to the lower pressure, pure oxygen atmosphere of the backpack. This would increase the risk to the astronaut and make it impossible to use the AMU for emergency repairs outside the spacecraft.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Slightly less modification would be needed for any of the MOL backpacks used in the Orbital Workshop. The Air Force had planned a two-gas system similar to that of the Orbital Workshop using a combination of oxygen and helium. So presumably their backpacks would already be equipped to handle a two-gas system and could be easily adapted to handle nitrogen and oxygen.

NASA, however, has scheduled an improved version of the AMU, called Jet Shoes, for use with its Orbital Workshop. As the name suggests, with the Jet Shoes the astronaut would have the propulsion thruster attached to his boots. He could then steer himself in any direction simply by moving his feet. This would eliminate the need for at least one of the control handles of the AMU.

Presumably the emergency oxygen supply would be worn on top of the backpack, as it is on the Moon. This would allow the astronaut to move closer to his work. He would also have his hands free to carry things while moving about. While Jet Shoes would be a convenience on any space walk they would be a necessity in cases where no handholds were available. They would also be needed when working with a satellite too small to provide enough mass to hold the astronaut in place.

An astronaut with Jet Shoes could climb out of the air lock and guide himself to his task with motions much like those of a skin diver. When he arrives he could set the controls of his backpack to hold him almost motionless in front of his work. With the radio in his backpack he could keep in touch with his fellow astronauts and Mission Control.

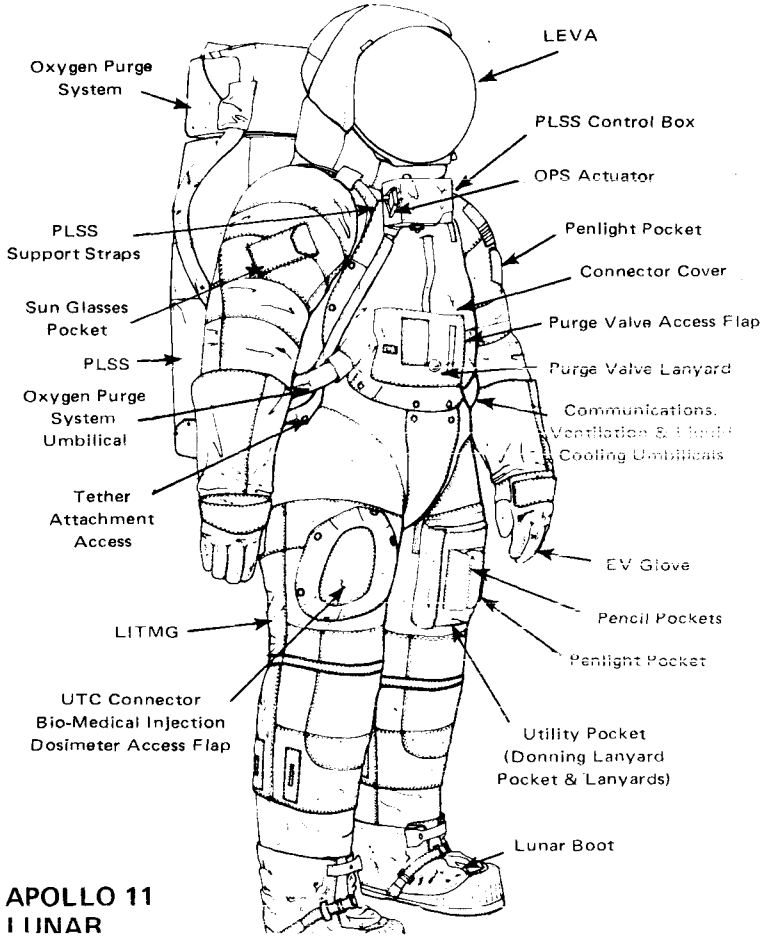
A PLSS would supply him with air and power for four hours of work outside the spacecraft. When his task was completed the astronaut would simply take any samples he was to retrieve in one hand, and head home. As he neared the space station he could turn so that he would land feet first.

Although it is not necessary a tether will probably be used as an added safety precaution, at least on the first space walks. On some missions, however, astronauts may actually find it safer to do wihout a tether that might become entangled with the satellite on which they are working. This problem often plagued divers before the development of scuba gear. They were hampered in their exploration of the deep by the need to keep their air hoses untangled.

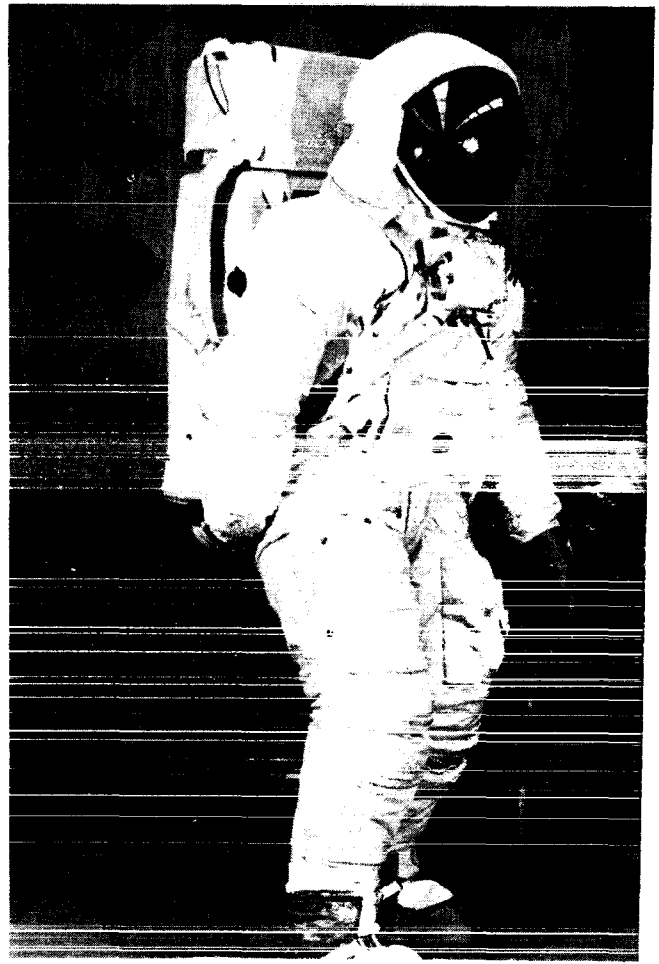
Another problem with long tethers and umbilical lines, already encountered by Gemini astronauts, is stowing the weightless line after the EVA. After the space walk on the Gemini 10 mission Astronauts Mike Collins and John Young found themselves with a 50-foot



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED




**APOLLO 11**
**LUNAR**



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

umbilical writhing around inside their cabin. This prompted Young to comment, "This place makes the snake house at the zoo look like a Sunday School picnic."

A variety of EVA activities have been planned for the astronauts aboard the Orbital Workshop. Much of this will be an extension of work begun on the Gemini program. This will include work with special space tools, and the erection of large pieces of equipment like antennas. Space walks may also be used to change film packs on the Apollo telescope mount when this module is added to the space station.

The astronauts will also be preparing for the manned flight to Mars by practicing orbital refueling and preparing for the assembly of the interplanetary ship. A spacecraft large enough to accomplish a manned Mars landing could not be sent up by a single launch, even with a Saturn V equipped with a nuclear third stage. So the Mars craft will have to be assembled in Earth orbit either by rendezvous, by EVA or, very likely, a combination of both.

Orbital refueling would be another way to ready a manned Mars spacecraft for its mission. It could also be used to make possible a reusable lunar shuttle craft.

NASA's Apollo astronauts will also be using their Jet Shoes for purposes very similar to those planned for the Air Force's MOL astronauts. This will be to rendezvous with unmanned satellites, inspect, and possibly repair or recover them. Of course, with the civilian space agency in charge, this activity will be free of the cloak-and-dagger espionage aspect it had in the military space program.

The Jet Shoes should also facilitate astronaut rescue. With the EMU alone it would be necessary to complete a docking, or a least a close rendezvous, in order for the astronauts to transfer from one craft to another. With the Jet Shoes, however, the craft need only come close enough to be distinguished from its starry background. If the Jet Shoes have the range of the AMU this could be as far away as 2,500 feet for a large spacecraft.

On a lunar landing mission this could extend rescue capability of the command module. Even if the lunar module were on a collision course with the higher Moon mountains, the astronauts could escape with their Jet Shoes. The third astronaut in the command module would be able to stay far enough away to clear the mountains.

As space travel continues the backpack will become an almost indispensable tool in man's continued travels. The PLSS is already being used to explore the Moon. With the addition of a thruster and stabilization system it can extend man's capabilities in space to their fullest. ■



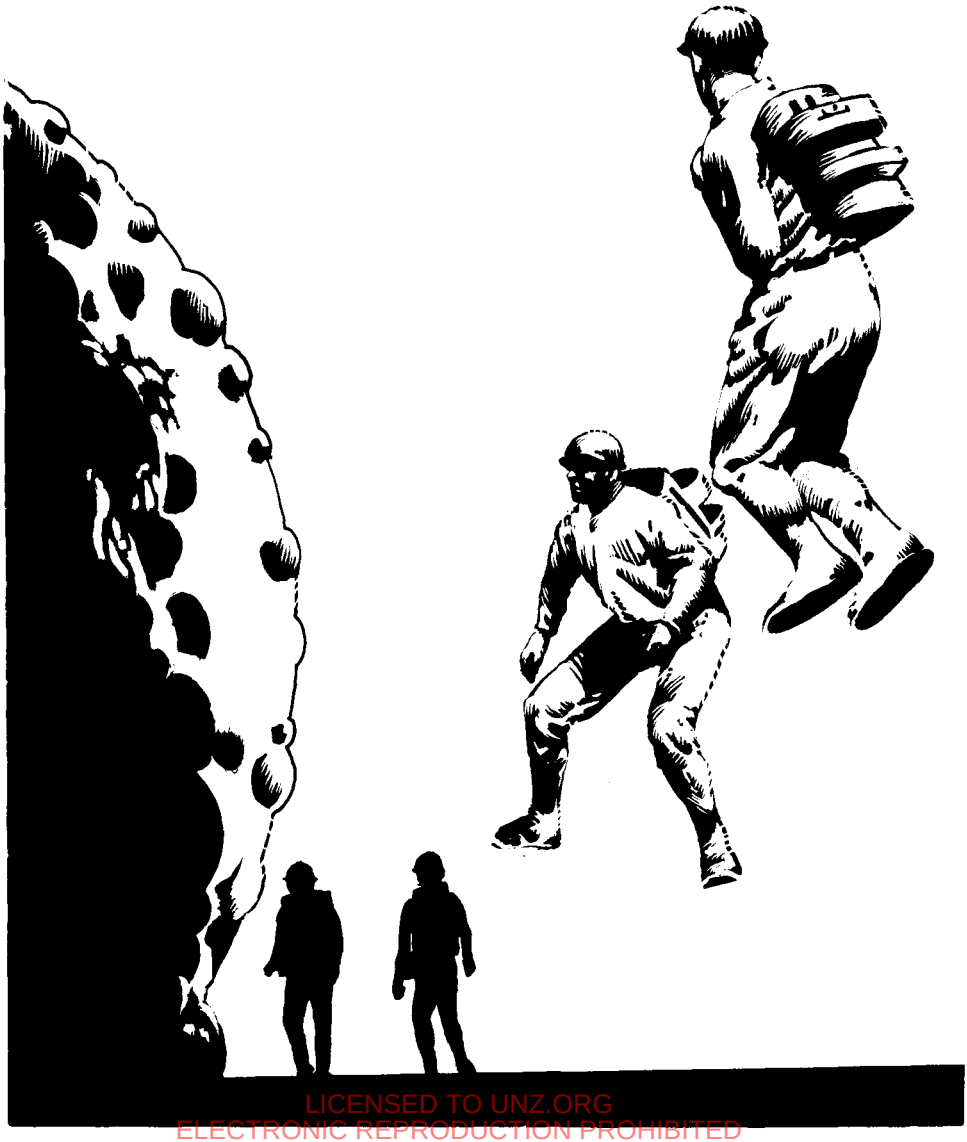
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

# *heavy thinker*

*Frustration is when you've found a perfect solution to a desperate problem—and find the solution can't be conveyed to the problem!*

*HOWARD L. MYERS*
*Illustrated by Vincent diFate*



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

*"Mind invasion!"*

Hage Borat snapped out the alarm as quickly as he could tongue his toothmike. And at almost the same instant, the other nineteen members of Lontastan Exploration Squad 4710-Z were shouting the same words.

Their voices rang a ragged chorus in Borat's right ear.

"Does everybody feel that?" he asked. "Sound off if you don't!"

The squad was silent. Then Danta spoke. "I feel it, but I retract the word 'invasion'. Something's looking at my thoughts as I think them, but that's all."

"Same here," several chorused.

"O.K.," responded Borat, "does that hold for everybody? Good. Now, does anybody have a fix on whatever it is? Who can locate it?"

Again silence from the squad. Borat rotated his body slowly in space as his eyes scanned the planetary system in which they had broken out of warp less than fifteen seconds ago. It definitely *was* a system, not a planetless star. He could see two inners plus three more out at gas-giant range.

"Intelligent life, you suppose, after all these centuries?" grunted Orrson.

"It's a weirdy, whatever it is," piped up Baune in her whimsical little-girl voice. "A sure-nuff telepath! I'm not sure I believe in it!"

"It's a telepath all right," Borat said, "and it has quite a range." The squad members had come out of warp with an average separation of over three million miles, as was usual in approaching a previously unvisited star, which spread them over quite an area of interplanetary space. And the telepath was watching them . . . had *started* watching them, judging from their reactions, at practically the same instant.

"What I wonder," Baune was saying, "is, does a telepath have to think? *We* think but don't telepath. Maybe *it* don't think, but *does*."

Borat grinned. "Cagoline," he snapped, "report this to headquarters, and keep it terse."

"Right," replied the communications man.

"My guess," said Sherris, "is that anything alive in this system is on the outer of those two visible inners. It could be Earth-type."

Borat had been thinking the same thing. Should he order part of the squad to approach the planet, or should he . . .

*"Welcome, thinkers!"* came the powerful—but definitely pleasant—roar of thought. "Yes, I'm on the world you have in mind, Captain Borat, and any, or all, of you may come down if you like. Also, forgive the delay in my response to



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

your presence. I had to learn your word-thought-symbols before I could address you."

"Who . . . What . . . Who are you?" asked Borat.

"I have no identity symbol," the telepath replied. "Presumably there must be two intelligent entities in association in order for the name-making process to begin."

"There's just you, in this whole system?"

"Yes, although my world has ample plant and lower animal life. Unfortunately, it never occurred to me to allow an intelligent animal species to develop here. Your existence, humans, is a lesson to me in enlightened self-interest. But without cognating the possibility of such beings as yourselves, how could I cognate their desirability?"

"In what manner do you find us desirable?" Borat asked cautiously.

"As fellow thinkers, as companions, as, perhaps, playmates," came the thought. "No, Baune, this is not a spider-and-the-fly ruse. From your thoughts concerning the chemical composition of your bodies, I do not think I would find you digestible. In actuality, Baune, the man called Orrson finds you far more appetizing than do I."

Baune giggled. "Naughty-minded Orry!" she chided. But her thoughts—suddenly perceptible to all—were wondering *Why didn't old Tall-and-Tough tell me?*

"I'm omnivorous," Orrson said with discomfited lightness while his thoughts ran *Old is right! Too old to rate with that delightful little bundle of youth.*

From Baune: *He means I'm too young for him. And he probably thinks I'm too silly, too.*

From Orrson: *No! She's not too young for me. I'm too old for her! Why's she saying things like that with the whole squad listening? I don't mind being kidded by her, but . . .*

From Baune: *Oh, damn, if I only were brazen enough to tell him! But he says I'm not too young, so maybe . . . I'm not saying anything! . . . Or kidding him, either!* "Hey! What's happening to me?"

From Orrson: *Thoughts! Our thoughts are communicating! That creature down on the planet . . . Glowing Baune! Could you possibly mean it?*

From Baune: *Oh, you big mighty monstrous marvelous old supermale . . . WOW!*

From Orrson: *Tremendous! But . . . nine nines are eighty-one, nine elevens are ninety-nine, nine thirteens are . . .*

Suddenly the thoughts of Orrson and Baune were no longer perceptible to the others.

"You humans view mental communication as desirable," the telepath apologized, "but with certain limitations. I believe I have the hang of it now."

Borat's mind was working fu-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

riously. Occasional humans had shown vague telepathic abilities, but nothing like this! The creature had inspected the thoughts of Orrson and Baune, decided to put them in close communication, and then, after belatedly discovering that such communion sought privacy, had closed off their thoughts from the rest of the squad!

What other capabilities the creature had—and how it might decide to use them—could not be guessed. Certainly the squad faced dangerous unknowns here.

But also unknown rewards. Functional telepathy! The Lontastan Federation needed something like that very badly in its econowar with the Primgran Commonality.

And in any event, the being was *apparently* friendly and well-intentioned. The squad's primary task, he decided, was to learn as much as possible about the creature and its telepathic ability.

He began by asking: "Are Orrson and Baune in permanent communication, or are you acting as a transceiver?"

"A difficult question," commented the telepath. "I am not consciously transceiving for them now, but when I establish a linkage, such as theirs, it continues unless I break it intentionally. Perhaps my awareness of their presence has something to do with it."

"You've linked minds before?" asked Borat.

"Not intelligent minds like yours, but life-flows of various types. That is one method of controlling the ecology of my world."

Borat considered this. "What would happen," he asked, "if Orrson and Baune traveled out of range of your awareness?"

"I have no idea," the creature responded.

"All right, we'll find out. Orrson! Baune!"

"Yes?"

"Warp away from this system in short jumps of increasing length. Start with light-minutes, and lengthen from there. If your telepathic linkage breaks down, report back, and in any case come back after you've gone out two light-years."

"Right."

"Cagoline," Borat continued, "are you through to Nexal?"

"Sure am! My report's raising a stir in headquarters!"

"O.K. Remain in space, Cagoline, and inform headquarters of developments as they occur. Danta, take charge of Orrson's crew and make a prelim of all planetary objects except the telepath's. My crew will go there. Questions?"

There were none.

"Start, then!" he commanded.

The squad—minus Cagoline, Orrson and Baune—went through a sequence of microwarps to gather into crew clusters. When in



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

formation, Borat's crew warped once more to achieve entry position twenty thousand miles above the telepath's world. At that point the crew went full-inert and plummeted downward.

"Your mobility is delightful to watch, and most educational," observed the telepath. "But I catch thought fragments to the effect that humans were once confined, as am I, to a single planet. Now, however, you identify yourselves with space itself, rather than as creatures of your planets of origin."

"Yes," said Borat. "We could not fly through space until we devised equipment—tiny machines—for propulsion and protection outside our ancestral planet's atmosphere."

"Please continue," requested the telepath. "Your thoughts on a subject become more ordered and complete when you speak of it."

"Very well. For propulsion we need devices for inertial control, which amounts to gravitational control, and a device to insert ourselves into warp vectors which take us out of normal space. For protection we need shielding and pressor fields surrounding us. And a variety of macro-molecules have to be imbedded into our body tissues. For example, our nasal and throat passages are lined with molecules that absorb, convert and release gases, to recycle the air from our lungs while we're out of breathable atmosphere. Then we have a power unit, implanted in our bodies along with the other life-support packages, to provide the energy for all these processes."

"I catch the thought," commented the telepath, "that these devices were first used in large vessels rather than in your bodies. Why were ships abandoned?"

"Because of prime-field turbulence. We still use small, unmanned ships for freight transport. Space isn't empty. There's a little gas almost everywhere in the galaxy, and in places the gas is relatively dense. Also, there are scattered clouds of dust particles.

"We . . . or our earlier ships . . . don't collide with this material when we travel in warp at superlight velocities. The warp removes us from normal space-time. But there is a reality underlying every particle of matter, a reality we call prime-field, and we don't get away from that when we go into warp. Our own prime-fields are turbulated by the fields of every atom of gas, or dust that we warp through.

"Now, the more mass an object in warp has, the worse the turbulence. The prime-field of a hydrogen ion, passing through my body in warp, might displace the prime-fields of half a dozen of my atoms, and they in turn might displace to a lesser degree the fields of two dozen more atoms before the



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

shockwave passed through my skin and dispersed. Very quickly, the prime-fields would snap back to their appropriate particles and no damage would be done.

"But if I had the size and mass of a ship, my field would collide with more particle fields, and the resulting turbulences would have more mass to work on. The turbulence would be violent and continuous if my mass were great enough.

"This would do no visible physical damage to me. An atom's prime-field can be disassociated from it without causing the atom to break down.

"But a mind is a prime-field phenomenon, as our first ship-warpers discovered. The turbulence in a large ship could push a man's mind . . . his identity . . . completely out of his body, perhaps to distances of billions of miles. Of course the ego-field as we term it would snap back at the first opportunity, but if that opportunity were delayed for several seconds the man's reality would be permanently impaired. He would, in short, be insane.

"So, we miniaturized the basic components of our spaceships to a point where they could be implanted in our bodies," Borat concluded, "and ceased flying in ships entirely. Also, we wear no more clothes, and carry no more massive equipment on our persons, than we consider necessary."

"Are you not now about to collide with the fields of this planet's atmospheric gases?" inquired the telepath.

"Yes, but field turbulence is noticeable only at superlight velocity. Our entry into your atmosphere is a purely physical problem and is handled by one of our protective forcescreens which shields us from frictional heat and extends, like wings or a parachute, to brake our fall."

The other members of the crew were exclaiming to each other about the appearance of the planet below, and Borat noted that it was, without doubt, the *healthiest* looking world he had ever seen. Not a swath of dead vegetation was visible anywhere on the land mass below, and only a few high-elevation outcrops of raw stone stood bare of plant life.

"Thank you," came the telepath's thought. "I'm pleased that my ecologic control produces results you find attractive."

Borat thought with a touch of awe, *He makes the whole world his garden!* And evidently he did so without hoe and rake, but by thought processes alone—perhaps by "approving" a certain plant, or animal, in a certain place, in the manner of humans noted for their "green thumb," and by disapproving a plant that attempted to sprout, or an animal that attempted to forage, in an unsuitable area.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

If this was the power of telepathy, then it was plainly a power the Lontastan Federation had to have!

Borat's crew landed some two hundred yards from the creature, and stood staring.

"We are," observed the telepath, "mutually appalled by one another's size."

"Is all of that *you*?" demanded Sherris.

"All of this and more," came the response. "Approximately one third of me is underground. My form is roughly spherical."

"Maybe we can name you Monte," Sherris murmured. "That meant mountain in one of our old languages."

"That will be satisfactory," the telepath replied.

The humans walked slowly toward the giant stony-looking ball that soared at least two hundred feet over the rolling grassland. To Borat, the creature . . . Monte . . . resembled nothing else as much as a colossal boulder, lying partially submerged in the soil.

"I had assumed," he said, "that you were basically animal in nature, with locomotive ability."

"I am," replied Monte. "If it became necessary for me to change my location, I could rock myself free of the soil deposited around me, and roll away. When my planet and I were younger, and I much smaller, frequent movements were necessary to escape being crushed, or deeply buried, by diastrophic processes.

"Once," the thought continued, "I overstayed in a spot that became the peak of a mountain, because of the nourishment I found there. When the nourishment was exhausted, the mountainsides were too steep for me to roll down without smashing myself."

"How did you get down?" asked Walver, one of the younger men in the crew.

"First I attempted to forest the slopes with a species of tree sturdy enough to brake my fall, but the climate was unfavorable for the trees. Eventually, I merely waited for erosion to lower the mountain."

"What nourishment was on the mountain?" asked Borat.

"Radioactive minerals. I am, as I told you, essentially animal, but one of my life-processes is similar to the photosynthesis of plant life. Only in my case the process is radiosynthesis. Ordinary light cannot penetrate to the depth of my synthesizing tissues. Thus, I always locate myself over the warmest radioactives I can find."

One of the crew's mineral specialists said to Borat, "There *is* hot ore under the surface deposits here. I'm getting a strong count."

Borat nodded, still looking at Monte. "You spoke of rolling yourself. How . . . ?"

"I breathe, of course," replied the massive sphere, "thus there is



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

an air cavity inside me. By shifting this cavity I can shift my center of gravity and achieve motion."

"Like a man walking inside a barrel," giggled Baune.

Borat blinked. "Are you two back?" he asked.

"Right," came Orrson's voice. "I think we can put the limit of the telepath's range at seventy-eight light-hours. That's where our linkage faded, and where it began rebuilding on our way back."

Borat frowned. "You lost it completely?"

"Afraid so," said Orrson. "But we have it back now."

"O.K. Come on down."

"Why the bugged expression, Hage?" asked Sherris.

"We need Monte's telepathy," he told her. "But we need it outside his field of awareness. If Orrson and Baune couldn't stay in communion with each other beyond that, I doubt if anyone else could."

"Oh," Sherris nodded. "You thought our people could visit here long enough to become telepathic, and from then on they would have a communication system far beyond anything the Primgranese can produce—except that it won't work."

"Right." Borat turned his gaze to Monte once more. "There is no way to make us permanently telepathic?" he asked.

"Regrettably not," replied the telepath. "Your thoughts concerning 'econo-war' are fascinating, and make me wish I could play on your side. You must find it thoroughly pleasurable."

"It was more fun while we were winning," Borat replied gruffly, "and we were until recent years. Then the Primgranese developed miniaturized emo-monitors—devices that enable one to read the emotional reactions of others—and included them in their standard life-support systems. The resulting gain in understanding gave their teamwork capabilities a tremendous boost, and modified their economic competition among themselves.

"We've been trying to close the emo-monitor gap," he added, "but duplicating what the Primgranese did is a slow, technically difficult task. If we could share your telepathy, we would have what the Primgranese have—and more. Otherwise, well, the way the competition has gone recently, the Lontastan Federation will probably be beaten beyond recovery before the end of the century."

The thought depressed all.

"But look!" protested Walver. "All we have to do to use Monte's telepathy is take him home with us!"

Borat grimaced. "Why do you think he remarked that we were mutually appalled by our relative sizes when we landed and he could make a comparison?"

"Oh, that," mumbled Walver. "He's too massive to warp."



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"I would say he's more massive than the biggest starship man ever tried to fly," Borat responded.

"However," put in the telepath, "we have unknowns that might work in our favor. Perhaps I can defend myself against prime-field turbulence, though you cannot. Our minds have their differences. Could not that be one of them?"

"I doubt it," said Borat. "Prime-field turbulence is one of the most basic phenomena of the universe. No kind of matter is immune to it."

"I am willing to put that to a test," Monte insisted.

Borat thought it over. "Well, perhaps—but not until we've exhausted every other possibility."

"Hey!" came Danta's voice from whatever planet in the system she was examining at that moment. "Does he reproduce?"

Grinning, Borat asked, "What about it, Monte? A small offspring of yours—or several of them could warp wherever they were needed in safety."

"That may be possible," Monte thought dubiously. "I have never tried reproducing because it never occurred to me. The durability of my body has been sufficient to perpetuate me without recourse to a reproductive process. I must give the idea some examination."

The whole crew felt Monte's mental withdrawal into solitary contemplation.

"Gad," breathed Walver, "when we finally found an alien intelligence, it was *real* alien! And he wants to join our war! Frankly, folks, I don't figure this at all!"

"It makes sense," retorted Borat. "Monte is super-intelligent, and obviously thoroughly sane. Thus he—"

"Why is he thoroughly sane? How do you know that?" demanded the younger man.

"The orderliness of his planet, for one thing," said Borat, "his enthusiasm for another, and his quick understanding of the nature of man, and of a multiple society, to cap it off. You notice he didn't inquire into the reasons for the econo-war. Was anybody doing any concentrated thinking on that subject, by the way?"

Nobody replied.

"Then he recognized our war, as we have only recently done ourselves, as a near-essential game for the progress of human society. He didn't have to have it explained to him."

"But why does he want to play the game with us?" asked Sherris. "Just for the sheer fun of mingling with other intelligences?"

"Partly, I think," Borat replied slowly. "But partly for his survival. He needs radioactives, and his planet is getting older. Diastrophism is slowing down here, and fewer and weaker radioactive ores are emerging on the surface. I think his basic purpose is to work out a mutual aid arrangement with us. He'll help with the econo-war



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

in return for the availability of radioactives."

Monte rejoined them mentally at that instant. "Such a hope had indeed occurred to me," he told them. "However, the production of offspring by me will be of no assistance to you. I find that I can reproduce, but only after a gestation period of fourteen of your centuries. Also, I recall that the ability to communicate with other life forms did not come to me until I had attained one-fourth of my present massiveness. My offspring, with a plentiful supply of radioactives and other nutritive requirements, might attain that size in half a billion years."

"Then telepathy is a function of brain-mass?" suggested Sherris.

"Possibly so."

"O.K., reproduction is out," said Borat. "What are the other possibilities?"

Cagoline spoke up, "Several Council of Commerce members on Nexal are urging a full-scale research project to investigate Monte's mind. They say if the telepathic synapse—whatever that is—can be isolated . . ."

"Tell them telepathy seems to be a function of brain-mass," Borat replied a trifle crossly. "The trouble is that research of that kind takes time . . . not as much as Monte's reproduction, but more time than we've got. Look how long it's taking our labs to duplicate the work of the Primgranese on life-support emo-monitors!"

"You might add," put in Monte, "that my participation in such a project does not strike me as fun."

"Tell them that, too, Cagoline," said Borat. "Now, if there are no other suggestions, let's start equipping Monte for the warp test."

"I don't have a suggestion," said Orrson. He and Baune had landed a short distance away and now walked up to join the group beside Monte. The man was frowning. "But I think we should be sure of what we're doing—and why. Maybe Baune and I feel a stronger attachment for Monte than the rest of you, and have a special stake in his well-being. But just the same, it's good sense not to go off half-cocked."

"O.K.," said Borat. "What do you question?"

"Well, as you said yourself, we can't really expect Monte to be able to *nullify* prime-field turbulence. It's too basic. And it's too akin to the stuff thoughts are made of to be cancelled by thought. All we can reasonably expect is that Monte will prove more able than ourselves to *endure* turbulence."

"No mind can endure it long," said Sherris.

"Right," said Orrson. "Just a split-second knockout of your ego-field, and you have to get the help of a psych-releaser to clean up the resulting trauma. And, if it lasts



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

two or three seconds, you get a trauma that can't be cleaned up at all—the one form of insanity that doesn't yield. And I'd hate to share the same universe with an insane mentality of Monte's power."

He paused, and the others were silent as the thought sank in. He continued, "If we let Monte make the test, we should keep it extremely brief . . . certainly no more than a second. Now, let's say we find that he *can* endure brief periods of turbulence, followed by periods in which he heals the resulting traumas, with or without human assistance. Over a span of several months or a few years, he could travel into the center of the Federation, to Nexal perhaps, by making several thousand of these minimal warp jumps. It would be risky for him, and probably unpleasant, but chances are he would make it.

"Now, here's my question. Once he was there, what *use* would he serve that would be worth the risk he had taken? And I'm not asking for a glowing generality, but for a highly specific answer. His telepathic range will cover only one planetary system. It can't have the Federation-wide application we need, to serve the same purpose as the Commonality's emo-monitors. So, how do we justify risking his sanity in a test?"

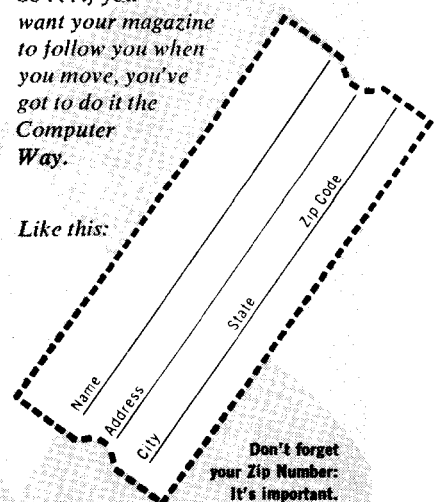
Cagoline's voice sounded in their ears: "Hage, let me take a crack at that one."


***With a magazine like Analog, you would, of course, expect us to use computers for handling subscriptions.***

***The trouble is—computers are very, very stupid. They need to be told EXACTLY what you want, in every detail. Or they get neurotic, and you don't get magazines. (Neurotic computers are known to have spit miles of tape, and thousands of punched cards all over the room before they could be shut down.)***

***So . . . if you want your magazine to follow you when you move, you've got to do it the Computer Way.***

***Like this:***




***Attach the computer-label from your old address to a change-of-address card, add your new address, and send to: ANALOG Science Fiction/Science Fact, Box 2205, Boulder, Colorado 80302***




LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Go right ahead," said Borat.

"O.K., here it is, Orrson," said the communications man. "Nexal's the place . . . the only place . . . we need Monte's services. I'm speaking as a guy who's stuck with a job that keeps him in touch with all too many of those Council of Commerce gabfests back home. The time those brass hats consume arguing! Makes me wonder sometimes if we're as sane as we say we are!"

"Sanity has nothing to do with differences of opinion, only with the manner in which they are settled," Borat put in. "The settling requires the exchange of sufficient information between the disputing parties to provide a basis for agreement. And the most desirable course to follow in dealing with the complexities of the econo-war can't be arrived at without considering a vast multitude of factors."

"And even then the brass comes up with a lot of wrong answers," Cagoline retorted sourly. "But that's what I'm getting at, anyway. With Monte on hand to put all those CofC brains in communion with each other, that information-exchanging routine would go a lot faster and surer. And the same process is needed at lower levels of government, and in corporation board rooms. Most of our corporations have their main offices on Nexal, and that's where they do their planning and get in their licks against each other. If Monte goes to Nexal, we won't *need* him anywhere else! Not much."

"Could you do what Cagoline has described, Monte?" asked Borat.

"Yes, indeed," came the eager answer. "I am now providing communion channels numbering in the trillions . . . at a sub-rational level, of course . . . among life specimens on this planet. Certainly I could do the same for the mere billions of persons on your capital planet."

"But your beautiful ecology!" mourned Baune. "If you come to Nexal with us, it'll go to pot!"

"That possibility does not disturb me," the telepath replied. "Your econo-war interests me more."

Borat eyed his second-in-command. "Satisfied, Orrson?" he asked.

"I suppose so," Orrson shrugged. "Yes."

"Then let's go to work."

The squad's equipment included several inertial-control packs, warp units, and power modules, brought along for use in the shipment home of discovered items that merited full study. For two days, most of the humans busied themselves around Monte, drilling holes through his tough shell, installing the necessary devices, and working out with him the means by which he could control their operation.

The latter was no serious prob-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

lem. Monte had ample nerve-ends under his shell, plus sufficient musculature and muscle-control.

When the job was done, Borat said, "On this trial run, Monte, let's keep the warp jump as short as possible. It has to be long enough for you to see what you can do about the turbulence, but not long enough to do you any harm. I would say a one-second jump . . ."

"A tenth of a second should suffice," responded the telepath. "A full second will be better, of course."

"Fine. Be sure to set the warp breakout on automatic, just in case. Go ahead whenever you're ready, and good luck."

Slowly, Monte's mountain-sized bulk lifted free of the grassy surface and drifted upward, semi-inert.

"If no more than this is achieved," the telepath commented happily, "this means of transportation is far superior to rolling."

"Fine. Don't try to warp before you're three planetary diameters up," said Borat.

Monte drifted on upward and out of sight of the members of the squad who were remaining on the ground. They settled down to wait.

An hour later he called, "I'm in position, and *here I go!*"

Then immediately: "That . . . was . . . *bad!*"

"You couldn't fight it?" asked Borat.

"No. As you said, Hage Borat, prime-field turbulence is exceedingly fundamental. A quarter of a second was all I could tolerate."

"O.K. Come on back."

"Very well, but my return will be slow. I do not care to warp again."

The humans looked at the disappointment in each other's faces. "Well, that's that," Borat said inanely.

Cagoline called, "Hage, the Council of Commerce on Nexal is in a tizzy. I've told them the bad news."

"Do they have any bright ideas?"

"No, people in tizzies seldom get bright ideas," the communications man contributed. "They had their hopes way up. They were counting on gaining something important from our discovery of Monte, or his discovery of us. They still aren't reconciled to taking a licking on this."

"They may as well accept it," growled Borat, "and put some more push behind emo-monitor development." After a moment he added, "Tell them we're staying here to study Monte and mine some radioactives for him . . . and tell them to try to come up with a workable idea."

Monte was four days getting down from interplanetary space, and was appreciative of the con-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

centrated uranium ore that awaited him.

"This is most generous of you," he told the squad, "in view of my inability to assist in the econo-war."

"You tried," shrugged Borat. "After all, *we're* supposed to be the experts on mobility, and it's no fault of yours if we can't find a way to transport you."

"Hey, I just thought of something!" yelped young Walver. "If we have an insoluble problem here, why don't we stick the Primgranese with it? We simply let word of Monte leak out and they'll tie up thousands of their best spies, saboteurs and sundry infiltrators on him! Monte could spot them as fast as they arrived, and we could capture them."

Borat frowned. "I hate to admit the problem *is* insoluble, and that our only use for Monte is a largely negative one such as that. At best it would give us only a short-term victory, and at worst, well, the Primgranese might solve the problem." He paused and shrugged. "Although I'm coming to the conclusion that no solution exists. There's no way to get Monte to Nexal."

"Well, frankly, I'm *glad!*" chirped Baune. "Not that I want us to lose the econo-war, but it would be such a *shame* for Monte to go away and let his beautiful ecology fall apart! If those old tycoons and bureaucrats on Nexal want Monte's help so bad, they can come to *him* instead of him going to *them.*"

There was an instant of stunned silence. Then Borat leaped to his feet.

"*That's it!*" he bellowed jubilantly. "*You've hit it, Baune!*"

"An excellently suitable solution!" came Monte's thought.

The whole squad was suddenly swarming around Baune, everybody trying to hug her at once. "But . . . but—" she tried to protest amid the hubbub, "think what a mess those billions of people will make of Monte's ecology!"

"Not with Monte running things," said Borat happily.

A few months later Monte's world had become the new and bustling capital of the Lontasta Federation. ■

**THE ANALYTICAL LABORATORY / February 1970**

| PLACE | TITLE | AUTHOR | POINTS |
|---|---|---|---|
| 1. | Birthright | *Poul Anderson* | 2.20 |
| 2. | In Our Hands, the Stars (Conc.) | *Harry Harrison* | 2.52 |
| 3. | The Fifth Ace | *Robert Chilson* | 2.77 |
| 4. | Dali, For Instance | *Jack Wodhams* | 3.52 |
| 5. | The Biggest Oil Disaster | *Hayden Howard* | 3.81 |



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

# excelsior!

*Ecology, like nuclear bombs,*
*depends on an exponential chain reaction.*
*And can be just about as deadly.*

**ROBERT CHILSON**

*Illustrated by Vincent diFate*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

*"That's odd,"* thought Arthur Ingram, looking at the omma with lifted eyebrow. The omma, perched at the base of a tree limb at shoulder height, looked steadfastly back. That, as an ancient quotation has it, was the odd thing. Ingram finished stripping the leaves off the spice reed, set the aromatic stem between his teeth, and took up his stick, which he had leaned against the tree, all without taking his eyes off the omma.

At the last motion, the omma disappeared with an oily slowness that puckered Ingram's forehead. Ordinarily the little animals flicked past, appearing and disappearing simultaneously. He had the feeling that the fist-sized omnivore was crouched on the other side of the tree, waiting for him to turn his back. But when he checked, he found nothing.

Ingram stood thoughtfully biting the reed and looking up and down the tree and at the other trees around. *"Might as well try to grab a specific handful of air as look at an omma,"* he thought. *"Ordinarily. Was it sick or something?"*

He turned away to continue his morning walk. Though he had recently entered his sixth quarter-century, his stride was still firm, the stick merely for the dew-wet and occasionally thorny branches. These early morning walks, he declared, would keep him on his feet for another half century—not by any means an impossibility. After a century spent in starships or the offices that controlled them, Ingram had rediscovered nature. He found himself, to his intense surprise, enjoying his retirement as much as he had ever enjoyed the fierce, at times violent, competition of interstellar trade.

Ommas, now. It surprised him that he knew so little about them, but then there was very little to know. When men had first come to Salamander, they had found that the ommas were at the bottom of all spinate food chains. All other spinal animals preyed either on them, or on their predators. It was not really odd that there were so few other animals in the same size ranges; the ubiquitous ommas were very efficient. Under them were the usual run of bugs and worms and occasional less-evolved small animals.

When he was a young man, the planet having been settled only a couple of decades, there was a fierce debate on the best means of altering the ecology. Some of it began to come back to him. Men had learned to handle ecologies with care—the hard way—long before Salamander was discovered. It was five Standard years, he remembered, before lizards and frogs were introduced from Hindustan. They were a precaution against the predators imported from Sandra and other planets to thin the population: an extra food supply. They wanted to make sure the little ani-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

mals weren't exterminated by some miscalculation.

Ommas were pests, though they could have been worse. Care was taken in the thinning process, and it seemed to have paid off; there were definitely fewer of them than there was a century ago. He had got his start as a construction super for a now-defunct Combine, erecting factories and processing plants, and the half dozen men in his crew spent most of their time off trying to keep the little critters out of their jerried temporary quarters.

It does nothing for a super's equanimity, Ingram recalled with a chuckle, to discover that the exposed arms of a construction robot have been jammed with twigs and leaves. Of course all the robots could not be kept employed around the clock, even on the tightest schedule. He had solved that by ordering all robots to hover above the trees between tasks, but he had never really found a way to keep the pests from nesting in the construction material—they loved pipes—or even the various attachments for the robots.

Ingram cut the shredded, chewed end off the spice reed and bit into a fresh section. His thoughts were distracted by the sight of a wild amber tree. They originated on June, quite a ways out. Plants, of course, were more freely transported from planet to planet than animals. Amber could be synthesized cheaply, and there was no great demand for amber candles; but the tree was attractive, with its smooth black bark and delicate flowers with their tiny, black-striped blue petals.

"Well I'll be scuttled," murmured Ingram aloud. An omma sat alertly on a limb, watching him. Its yellow eyes were impassive, the brown bark-patterned hide on its lithe body not matching the amber tree's bark. *"There really must be something wrong with it—with them,"* he added, not speaking. He had left the first one behind him, of course. A disease spreading through them? Perfectly possible. Not an epidemic, though the sight of two sick ommas in one morning meant they were hit hard. But he had heard the scurry and seen the flick of normal ommas all around him. In fact, it was so normal that he had paid no attention, though thinking about ommas at the time.

The omma finally slid down behind the limb, slowly. After a prolonged moment, he looked behind it. No omma. "Now there's something wrong here," he muttered, half-aloud. "If they don't run at sight because they're sick—how can they disappear so fast when they do hide? Ergo they must not be sick. Now that *is* wrong."

No animal subject to such heavy predation will sit up and stare at any other animal, especially one as



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

large as a man. Salamander did not, of course, have any man-sized carnivores, or omnivores, that made ommas a regular part of their diet, but there were plenty of animals of all sizes that would eat any they could get. Ingram stood chewing his reed, puzzling over it.

*"Maybe predation has fallen off in this area and they're getting bold. Young ones. Or maybe they're so heavily overpopulated they're going weightless. Stresses on overpopulated animals will actually cause them to suicide, they say; or at least take actions leading to their own deaths, that they'd not have done ordinarily."* He had seen seatuses deliberately beaching themselves on Folly in that planet's early days.

Ingram strolled on, revolving the two ideas. At an opening in the trees he saw the top of the mile-high Tower—that was his name for it; he had never troubled to find out its name, purpose, or owner. It was the only building visible from his house, though there were other residences scattered through the forest. He oriented himself by it and resisted an impulse to consult his chron; he was no longer keeping anybody's schedule.Turning his back to the Tower, he strolled toward home and breakfast.

The overpopulation idea was the most reasonable, he concluded idly. It struck him that the sounds of ommas were more frequent this morning than usual. There were more of them around, it seemed, than there had been even in the old days. Of course, memory is unreliable.

And again! Ingram had been half-consciously scanning every tree as he passed it. This omma might have been missed otherwise; it was half-concealed behind a tangle of creeper leaves. He raised his stick to the level, sighted on it, stepped forward, and thrust at it. It disappeared with a flick and a scrabble of claws on bark.

"That's more like it," declared Ingram, nodding companionably to the thorn tree with the creeper. The normal disappearance relieved him a little. *"It's possible"* he mused silently, going on, *"that I'm bowling along about nothing. Maybe they're just curious about human beings. This section of the forest is almost untouched. And ommas are curious little devils."*

Lengthening his stride in anticipation of breakfast, it occurred to him that the overpopulation theory could not be right; even ommas do not triple their numbers overnight. Yesterday and the day before, he had heard a number of ommas, but nothing like this. And last week, though he hadn't been coming so deeply into the forest, he had hardly noticed them. He considered it idly, attention more on the empty state of his stomach. It occurred to him, too, that he had



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

come farther this morning than usual; he was far off his own land, not that it mattered.

A dense section of forest loomed up, seeming very dark with the sun behind it. *"Probably composed mostly of native thorn trees,"* Ingram moaned. He paused a while to watch a red-winged sundancer teaching her cubs to fly; then, taking a deep breath, plunged in. The stick and his tough clothes stopped most of the thorns from pinking him, and once inside he found that there were not so many as he had feared; but he was soon drenched. The synthetic fabric of his clothes could not be wet, but they were porous. Also, they had openings, such as the back of the neck.

It belatedly occurred to him that it could not be as late as he had thought; the dew was still both plentiful and quite cold. He had had time enough to go around, if he had thought. But his stomach was as insistent on regular hours as ever the Combines had been. Pausing to wipe the back of his neck and catch his breath—the cold water took it—Ingram noticed two more ommas watching.

He grinned sheepishly. "I hope you're enjoying the sight," he told them. "At that it's fitting that you should be amused by me; I came out to be amused by you and your fellow creatures." Glancing around the dark wood, he decided that he was about halfway through. He shivered a little and hoped the development agent was right when she said that all dangerous animals in this area had been exterminated and the ecology readjusted to prevent their return. At least he could not hear anything moving but the ommas. There seemed to be quite a few here.

He struggled on, the ommas following curiously; he heard and glimpsed a number of them around him. More important, he glimpsed sunlight ahead. It was as dim as early dawn in this grove; outside, sunlight had crawled down the trees almost to the ground. Encouraged, he gripped his stick, lifted a dew-laden branch out of the way, stepped under it, and gasped as three ommas, leaping off, sent a cascade of water over his head.

"Little devils!" Brushing back his drenched, thinning hair, he went on, watching closely for ommas. To his amazement, there were clusters of them on every tree and bush. *"This must be where a coven of 'em live,"* Ingram thought. *"No wonder I saw so many today; I've never been out here before."* One last thick mat mostly of thorns, and he'd be out, or nearly. He waded gingerly into it, so carefully that he only had to unstick his shirt from the thorns a couple of times.

Halfway through, though, a thorny branch seemed to wrap itself around his ankle. He drew it



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

back cautiously, but it didn't release. He shook it, peering down into the gloom around his feet to see what was happening; that didn't feel like any thorn. It felt more like—*ow!* Teeth had descended on his fingers and he released a branch that slapped across his chest. "The little bugeater bit me!" he complained, looking at the finger. The bite showed pink, but was not yet bleeding. Teeth again attacked his ankle, hampered by the tough synthetic of his sock. He kicked out and the little animal lost its hold. Others scuttled near.

*"I must be walking right into their dens,"* Ingram thought. *"As if the thorns weren't bad enough. I never knew the little imps were so bold."* He plunged in more blindly, turning his back and shoulders to the worst of the branches. The ommas followed closely, squealing and chittering. They clustered around his ankles, biting at every opportunity. They did not trouble him much until he felt one on his shoulders. It bit at him through his shirt, and he paused to brush it off.

That was a mistake. They came swarming up his pants legs, sharp claws digging through to the skin. They scurried up over him in the trees and dropped by twos and threes on his head and shoulders. His ears were bitten several times, and little claws gripped his fingers when he tried to brush them off. Or they sank about two dozen claws into his skin through his shirt and hung on grimly when he pulled at their leathery bodies.

Finally he realized that they were climbing on faster than he could take them off. He plunged, staggering, into the brush, ignoring the thorns, head down, backing through for the most part. With a convulsive struggle and a last wrench, he tore himself free from the thorns, crashed through the last line of trees in the dense grove, and fell at full length over a creeper. He was breathing heavily, as much from shock as anything.

"So *keep* your denning," he gasped feebly, looking back at a couple of triumphant ommas. Little demons. *"But though,"* as Tom Bowling said to the Caridian port authorities, "it's such a *little* ship," they were determined to defend their dens.

Before he could take stock of his injuries, or start pulling thorns, a horde of squealing and chittering ommas poured out of the dark wood and swarmed over him. Ingram surged to his hands and knees, chilled now with real fear. He swung his stick blindly, parallel to the ground, felt it connect with several small bodies. He made it to his knees, tore one off his head, lost his balance and fell back to hands and knees. Instantly a swarm of them ran up his arms.

There were hundreds of the things. Ingram fought with blind panic, realizing the ommas meant to kill. *"Thing to do,"* he thought,



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

struggling grimly to his feet, *"is to get away from the pack. Take such small animals a long time to down so big a predator. They're not adapted for . . ."* Reaching his feet, he staggered off as fast as he could go, blindly, not stopping to dislodge those already on him. The idea was to keep more from getting on. Some, changing position, were falling off.

After a few minutes, Ingram began to calm down. He found himself far enough ahead of the ommas to slow down, and tore off several from his shoulders and back. He was vaguely surprised to find that the rest were gone. He was panting now, and tired, but knew he could not stop; he could hear the little animals scurrying after him. A fast walk was sufficient; not to keep ahead of them, but to keep them from massing for a rush. They quickly learned that they could not take him two or three at a time. But, if they ever got him down again . . .

He quelled a touch of panic at the thought, and steered away from thick spots in the forest. He had been heading blindly for the sun, but as the pressure eased, he kept glancing over his shoulder for a sight of the Tower top. A couple of glimpses of it were sufficient to orient him. He trimmed his course—a little to the left of the sun—and strode rapidly, breath whistling, stomach weightless with fear, or, at least, apprehension. The ommas bracketed him, climbing onto branches ahead and waiting till he passed. Ingram took to whacking all low branches with his stick.

*"At least I'm no longer hungry,"* the thought, and steered away humor. He ignored the dryness of his mouth, the tiredness of his legs, and the speed of his pulse and breath. Presently, he entered a sizable glade he recognized; he was all of three miles from home. More if you counted what he called Misty Hollow, a tangled section just west of the house. It would not be wise to try to cross that hollow, but going around might be just as bad. He wasn't sure just how long he could keep up this pace. Of course the ommas might not follow him much farther.

This glade was a hundred feet across, and as long as he stayed on his feet, perhaps occasionally shifting his position, he should be all right, he thought. Of course they'd wait for hours if he stopped here. Watching them warily, he dug his fingernail into the notches of his utility bracelet. "Arthur Ingram's residence, monitor speaking," it said tonelessly.

"Ingram speaking," he said hoarsely. "Triangulate on my beacon."

"You are three-point-three Standard miles from the house," it informed him. "Four points south of west. Further instructions?"



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Ingram opened his mouth, closed it. Of course—send the car out to pick me up! But the aircar was in the garage, and while it could receive orders by radio, he had no radio that could reach it. The house was shielded, of course. Its intercoms were wired. The monitor could speak to the aircar, or he could himself, through his UB com and the monitor's mikes. But though the car had outside mikes, it hadn't been programmed to take orders through them.

They were creeping up on him through the brush. Ingram paced slowly away, mind racing. So near, yet so far. He turned his back on a sprouting stump he wished he could sit down on, looked anxiously at the Tower, and caught just a glimpse of a point of golden light near its top. He frequently saw light-colored aircars about it near sunrise; it was either a hotel, office building, or some kind of institution. That gave him an idea. Stumbling more rapidly in circles around the glade, he asked, "What's the location of the nearest public building?"

For several seconds the monitor consulted the house library and checked with Traffic Control. "The Interstellar Rookery, approximately thirty miles west. Distance and direction can be calculated more accurately if—"

"No. Call them up and have Service send a robocab out on my beacon."

"Done. Arrival time, five minutes."

When it came, Ingram collapsed into it and croaked, "To the house of Arthur Ingram."

For so short a trip, the aircar did not bother with high acceleration. Ingram had time to pick thorns out of his burning flesh and recover some of his equanimity. He was not really hurt at all, considerably to his surprise. Oddly enough, his first coherent thought was a flash of anger at the monitor for telling him the name of the Tower. Rookery! What a prosaic name!

On landing, his first act was to wet his throat. Then he ordered breakfast and sat back with a cup of coffee, considering his experience with his usual amused detachment.

He should not have been attacked even by a pack of such small omnivores. It was not something animals in their ecological niche ever did. Ingram puzzled it over for a while, finally nodded. He was using excellent ecological reasoning, but the ecological mode is not the only way of thinking about animals. A century and more ago, enormous pressure had been put on the ommas. Predation, already severe, had become fierce. At the same time, their food supply had been augmented by the introduction of new prey for them, primarily lizards. The theory was that they would get their food in



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

larger lumps of meat, cutting down on the dangerous, time-consuming task of searching for the bugs, small plants, and buds that they ate.

The theory had seemed to work, he remembered. But, once results were satisfactory, everybody had apparently forgotten about the ommas. And while no one was watching, the ommas began to find other ways of responding to the change in their environment. What more natural than that some of them would begin to specialize as lizard-eating carnivores? Probably others were specializing as herbivores: ommas were very adaptable. In any case, evolving the speed and intelligence needed to catch lizards would put them into the omma-eating category themselves; a leg up the evolutionary ladder. Being already gregarious, hunting in packs would be discovered early.

*"It is doubtful if they'd ever be a danger to men or other large animals,"* mused Ingram, *"but when an animal begins to change its mode of living, it has to find its new limits by trial and error."* He probably never would have been attacked if he hadn't been near their denning. But it was hard to imagine a nurben or felshim from Sandra having much impact on such a pack.

Point was, that ecology is not the kind of science in which problems can be solved. It's a continuing process, like a whirlpool or a river's relation to its banks. It was impossible to say, as yet, how successful the ommas would be. If they succeeded, the whole ecology, calculated so carefully so long ago, would collapse.

*"The ecologists,"* he thought, *"had forgotten that it's ecological pressure that forces adaptive evolution."* At least it was a good bet they had. The habit of planning ahead does not come easy to men whose life-expectance is a century and a half. Signs of the adaptation should have been seen long since. But he hadn't heard of it. There must be no one watching. This sort of thing might well be happening on every planet in the sector and nobody the wiser.

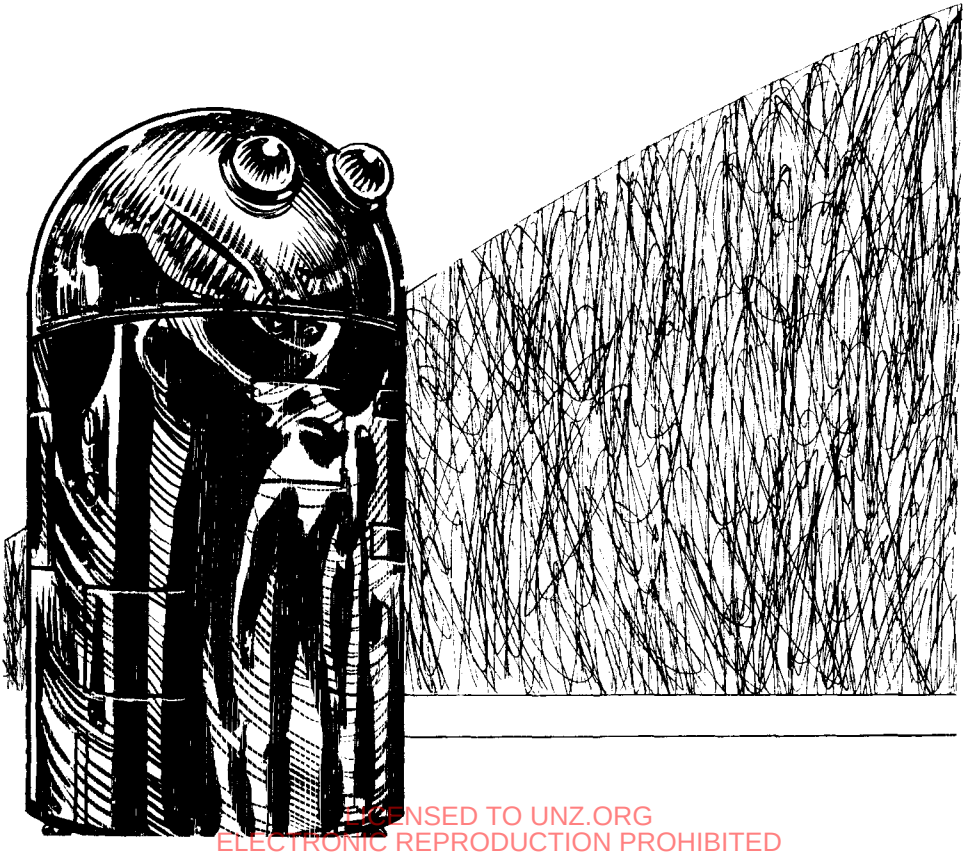
Ingram carried his cup to the unicom. "Connect me with the Ecological Service," he ordered the monitor.

After a moment its toneless voice replied, "There is no government Ecological Service listed. Darien Combine lists a private Ecological Department of its Colonization Company. Both Salamander government's Conservation and Development Department and the interstellar Penetration Service deal in ecological problems. Which do you wish to consult?"

"So there's no ecological service?" asked Ingram, smiling grimly at his lined, battered reflection in the unicom's visiplate. "Something will have to be done about that." ■



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

*The new form of beat-cop was just what people always said they wanted—the perfect "government of laws, not of men." But like most perfectly logical things, it wasn't what they really needed . . .*

BEN BOVA and HARLAN ELLISON

*Illustrated by Kelly Freas*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Crazy season for cops is August. In August the riots start. Not just to get the pigs off campus—where they don't even happen to be, because school is out—or to rid the railroad flats of *Rattus norvegicus*, but they start for no reason at all. Some bunch of sweat-stinking kids get a hydrant spouting and it drenches the store front of a shylock who lives most of his time in Kipps Bay when he's not sticking it to his Spanish Harlem customers. The owner comes out of the pawnshop with a Louisville Slugger somebody hocked once and takes a swing at a *mestizo* urchin. The next thing the precinct knows they've got a three-star riot going on two full city blocks. The copchoppers from Governor's Island are called in and spray the neighborhood with quiescent. After a while the beat cops go in with breathers, in threes, and they start pulling in the bash-head cases. Why did it get going? A little water on a store window that hadn't been squeegee'd since 1974? A short temper? Some kid flipping some guy the bird? No.

Crazy season is August.

Housewives take their steam irons to their old men's heads. Basset hound salesmen, who trundle display suitcases full of ready-to-wear for eleven months, without squeaking at their bosses, suddenly pull twine knives and carve up taxi drivers. Suicides go out ten-story windows and off the Verrazano-Narrows Bridge like confetti at an astronaut's parade down Fifth Avenue. Teen-aged rat packs steal half a dozen cars and drag-race them three abreast against traffic down Columbus Avenue till they run them through the show windows of supermarkets. No reason. Just August. Crazy season.

It was August, that special heat of August when the temperature keeps going till it reaches the secret kill-crazy mugginess at which point eyeballs roll up white in florid faces and gravity knives appear as if by magic, it was that time of August, when Brillo arrived in the precinct.

Buzzing softly—the sort of sound an electric watch makes—he stood inert in the center of the precinct station's bullpen, his bright blue-anodized metal a gleaming contrast to the paintless worn floorboards. He stood in the middle of momentary activity, and no one who passed him seemed to be able to pay attention to anything *but* him:

Not the traffic cop being berated by his sergeant for having allowed his parking ticket receipts to get waterlogged in a plastic bag bombardment initiated by the last few residents of a condemned building.

Not the tac/squad macers reloading their weapons from the supply dispensers.

Not the line of beat cops forming-up in ranks for their shift.

Not the desk sergeant trying to book three hookers, who had been arrested soliciting men, queued-up



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

in front of a network game show called "Sell A Sin."

Not the fuzzette using a wrist bringalong on the mugger who had tried to snip a cutpurse on her as she patrolled Riverside Drive.

None of them, even engaged in the hardly ordinary business of sweeping up felons, could avoid staring at it. All eyes kept returning to the robot: a squat cylinder resting on tiny trunnions. Brillo's optical sensors, up in his dome-shaped head, bulged like the eyes of an acromegalic insect. The eyes caught the glint of the overhead neons.

The eyes, particularly, made the crowd in the muster room nervous. The crowd milled and thronged, but did not clear until the chief of police spread his hands in a typically Semitic gesture of impatience and yelled, "All right, all ready clear this room!"

There was suddenly a great deal of unoccupied space.

Chief Santorini turned back to the robot. And to Reardon.

Frank Reardon shifted his weight uneasily from one foot to the other. He absorbed the police chief's look and tracked it out around the muster room, watching the men who were watching the robot. *His* robot. Not that he owned it any longer . . . but he still thought of it as his. He understood how Dr. Victor Frankenstein could feel paternal about a congeries of old spare body parts.

He watched them as they sniffed around the robot like bulldogs delighted with the discovery of a new fire hydrant. Even beefy Sergeant Loyo, the desk sergeant, up in his perch at the far end of the shabby room, looked clearly suspicious of the robot.

Santorini had brought two uniformed lieutenants with him—Administrative assistants . . . donkeywork protocol guardians. By-the-book Civil Service types, lamps lit against any *ee*-vil encroachment of dat ole debbil machine into the paydirt of human beings' job security. They looked grim.

The FBI man sat impassively on a stout wooden bench that ran the length of the room. He sat under posters for the Police Athletic League, the Fourth War Bond Offensive, Driver Training Courses and an advertisement for *The Christian Science Monitor* with a FREE—TAKE ONE pocket attached. He had not said a word since being introduced to Reardon. And Reardon had even forgotten the name. Was that part of the camouflage of FBI agents? He sat there looking steely-eyed and jut-jawed. He looked grim, too.

Only the whiz kid from the mayor's office was smiling as he stepped once again through the grilled door into the bullpen. He smiled as he walked slowly all around the robot. He smiled as he touched the matte finish of the machine, and he smiled as he made



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

pleasure noises: as if he was inspecting a new car on a showroom floor, on the verge of saying, "I'll take it. What terms can I get?"

He looked out through the wirework of the bullpen at Reardon. "Why do you call it Brillo?"

Reardon hesitated a moment, trying desperately to remember the whiz kid's first name. He was an engineer, not a public relations man. Universal Electronics should have sent Wendell down with Brillo. *He* knew how to talk to these image-happy clowns from City Hall. Knew how to butter them so they put ink to contract. But part of the deal when he'd been forced to sell Reardon Electronics into merger with UE—after the stock raid and the power grab, which he'd lost—was that he stay on with projects like Brillo. Stay with them all the way to the bottom line.

"It's . . . a nickname. Somebody at UE thought it up. Thought it was funny."

The whiz kid looked blank. "What's funny about Brillo?"

"Metal fuzz," the police chief rasped.

Light dawned on the whiz kid's face, and he began to chuckle; Reardon nodded, then caught the look of animosity on the police chief's face. Reardon looked away quickly from the old man's fiercely seamed features.

Captain Summit came slowly down the stairs to join them. He was close to Reardon's age, but much grayer. He moved with one hand on the banister, like an old man.

*Why do they all look so tired?* Reardon wondered. *And why do they seem to look wearier, more frightened, every time they look at the robot? Are they afraid it's come* their *turn to be replaced? Is that the way I looked when UE forced me out of the company I created?*

Summit eyed the robot briefly, then walked over and sat down on the bench several feet apart from the silent FBI man. The whiz kid came out of the bullpen. They all looked at Summit.

"O.K., I've picked a man to work with him . . . it, I mean." He was looking at Reardon. "Mike Polchik. He's a good cop; young and alert. Good record. Nothing extraordinary, no showboater, just a solid cop. He'll give your machine a fair trial."

"That's fine. Thank you, Captain," Reardon said.

"He'll be right down. I pulled him out of the formation. He's getting his gear. He'll be right down."

The whiz kid cleared his throat. Reardon looked at him. *He* wasn't tired. But then, *he* didn't wear a uniform. *He* wasn't pushed up against what these men found in the streets every day. *He lives in Darien, probably,* Frank Reardon thought, *and buys those suits in quiet little shops where there're*



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

*never more than three customers at a time.*

"How many of these machines can your company make in a year?" the whiz kid asked.

"It's not my company any more."

"I mean the company you work for—Universal."

"Inside a year: we can have them coming out at a rate of a hundred a month." Reardon paused. "Maybe more."

The whiz kid grinned. "We could replace every beat patrolman . . ."

A spark-gap was leaped. The temperature dropped. Reardon saw the uniformed men stiffen. Quickly, he said, "Police robots are intended to *augment* the existing force." Even more firmly he said, "Not replace it. We're trying to *help* the policeman, not get rid of him."

"Oh, hey, sure. Of *course!*" the whiz kid said, glancing around the room. "That's what I meant," he added unnecessarily. Everyone knew what he meant.

And in the silence that followed, heavy footsteps could be heard coming down the stairs from the second-floor locker rooms.

He stopped at the foot of the stairs, one shoe tipped up on the final step; he stared at the robot in the bullpen for a long moment. Then the patrolman walked over to Captain Summit, only once more casting a glance into the bullpen. Summit smiled reassuringly at the patrolman and then gestured toward Reardon.

"Mike, this is Mr. Reardon. He designed—the robot. Mr. Reardon, Patrolman Polchik."

Reardon extended his hand and Polchik exerted enough pressure to make him wince.

Polchik was two inches over six feet tall, and weighty—muscular; thick forearms the kind found on men who work in foundaries; light, crew-cut hair; square face, wide open; strong jaw; hard eyes under heavy brow ridges. Even his smile looked hard. He was ready for work, with a .32 Needle Positive tilt-stuck on its Velcro fastener at mid-thigh. His aura keyed one work: cop.

"The captain tells me I'm gonna be walkin' with your machine t'night."

Nodding, flexing his fingers, Reardon said, "Yes, that's right. The captain probably told you, we want to test Brillo under actual foot-patrol conditions. That's what he was designed for: foot patrol."

"Been a long time since I done foot patrol," Polchik said. "Work a growler, usually."

"Beg pardon?"

Summit translated. "Growler: prowl car."

"Oh. Oh, I see," Reardon said, trying to be friendly.

"It's only for tonight, Mike," the captain said. "Just a test."



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Polchik nodded as though he understood far more than either Reardon, or Summit, had told him. He did not turn his big body, but his eyes went to the robot. Through the grillwork Brillo—with the sort of sound an electric watch makes—buzzed softly, stared at nothing. Polchik looked it up and down, slowly, very carefully. Finally he said, "Looks O.K. to me."

"Preliminary tests," Reardon said, "everything short of actual field runs . . . everything's been tested out. You won't have any trouble."

Polchik murmured something.

"I beg your pardon?" Frank Reardon said.

"On-the-job-training," Polchik repeated. He did not smile. But a sound ran through the rest of the station house crew.

"Well, whenever you're ready, Officer Polchik," the whiz kid said suddenly. Reardon winced. The kid had a storm window salesman's tone even when he was trying to be disarming.

"Yeah. Right." Polchik moved toward the front door. The robot did not move. Polchik stopped and turned around. Everyone was watching.

"I thought he went on his own, uh, independ'nt?"

They were all watching Reardon now.

"He's been voice-keyed to me since the plant," Reardon said. "To shift command, I'll have to prime him with your voice." He turned to the robot. "Brillo, come here, please."

The word *please.*

The buzzing became more distinct for a moment as the trunnions withdrew inside the metal skin. Then the sound diminished, became barely audible, and the robot stepped forward smoothly. He walked to Reardon and stopped.

"Brillo, this is Officer Mike Polchik. You'll be working with him tonight. He'll be your superior and you'll be under his immediate orders." Reardon waved Polchik over. "Would you say a few words, so he can program your voice-print?"

Polchik looked at Reardon. Then he looked at the robot. Then he looked around the muster room. Desk Sergeant Loyo was grinning. "Whattaya want me to say?"

"Anything."

One of the detectives had come down the stairs. No one had noticed before. Lounging against the railing leading to the squad room upstairs, he giggled. "Tell him who some'a your best friends are, Mike."

The whiz kid and the chief of police threw him a look. Summit said, "Bratten!" He shut up. After a moment he went back upstairs. Quietly.

"Go ahead. Anything," Reardon urged Polchik.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The patrolman drew a deep breath, took another step forward and said, self-consciously, "Come on, let's go. It's gettin' late."

The soft buzzing—the sort of sound an electric watch makes—came once again from somewhere deep inside the robot. "Yes, sir," he said, in the voice of Frank Reardon, and moved very smoothly, very quickly, toward Polchik. The patrolman stepped back quickly, tried to look casual, turned and started toward the door of the station house once more. The robot followed.

When they had gone, the whiz kid drywashed his hands, smiled at everyone and said, "Now it begins."

Reardon winced again. The desk sergeant, Loyo, rattled pencils, tapped them even, dumped them in an empty jelly jar on the blotter desk. Everyone else looked away. The FBI man smiled.

From outside the precinct house the sounds of the city seemed to grow louder in the awkward silence. In all that noise no one even imagined he could hear the sound of the robot.

Polchik was trying the locks on the burglar-proof gates of the shops lining Amsterdam between 82nd and 83rd. The robot was following him, doing the same thing. Polchik was getting burned up. He turned up 83rd and entered the alley behind the shops, retracing his steps back toward 82nd. The robot followed him.

Polchik didn't like being followed. It made him feel uneasy. *Damned piece of junk!* he thought. *He rips one of them gates off the hinges, there'll be hell to pay down at the precinct.*

Polchik rattled a gate. He moved on. The robot followed. *(Like a little kid,* Polchik thought.) The robot grabbed the gate and clanged it back and forth. Polchik spun on him. "Listen, dammit, stop makin' all that racket! Y'wanna wake everybody? You know what time it is?"

"1:37 a.m." the robot replied, in Reardon's voice.

Polchik looked heavenward.

Shaking his head he moved on. The robot stopped. "Officer Polchik." Mike Polchik turned, exasperated. *What now?*

"I detect a short circuit in this alarm system," the robot said. He was standing directly under the Morse-Dictograph Security panel. "If it is not repaired, it will cancel the fail-safe circuits."

"I'll call it in," Polchik said, pulling the pin-mike on its spring-return wire from his callbox. He was about to thumb the wristband callbox on, when the robot extruded an articulated arm from its chest. "I am equipped to repair the unit without assistance," the robot said, and a light-beam began to pulse at the end of the now goose-necked arm.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Leave it alone!" Polchik said.

"A simple 155-0 system," the robot said. "Fixed temperature unit with heat detectors, only barely exceeding NFPA standard 74 and NFPA 72-A requirements." The arm snaked up to the panel and followed the break line around the outside.

"Don't touch it! It'll set it—"

The panel accordion-folded back. Polchik's mouth fell open. "Oh, my God," he mumbled.

The robot's extruded arm worked inside for a long moment, then withdrew. "It is fully operable now." The panel folded back into place.

Polchik let the pin-mike slip from his fingers and it *zzzzz*'d back into the wristband. He walked away down the alley, looking haunted.

Down at the corner, the Amsterdam Inn's lights shone weakly, reflecting dully in the street's oil slick. Polchik paused at the mouth of the alley and pulled out the pin-mike again. He thumbed the callbox on his wrist, *feeling* the heavy shadow of the robot behind him.

"Polchik," he said into the mike.

"O.K., Mike?" crackled the reply. "How's yer partner doing?"

Glancing over his shoulder, Polchik saw the robot standing impassively, gooseneck arm vanished; ten feet behind him. Respectfully. "Don't call it my partner."

Laughter on the other end of the line. "What's'a'matter, Mike? 'Fraid of him?"

"Ahhh . . . cut the clownin'. Everything quiet here, Eighty-two and Amsterdam."

"O.K. Oh, hey, Mike, remember . . . if it starts to rain, get yer partner under an awning before he starts t'rust!"

He was still laughing like a jackass as Polchik let the spring-wire *zzzzz* back into the callbox.

"Hey, Mike! What you got there?"

Polchik looked toward the corner. It was Rico, the bartender from the Amsterdam Inn.

"It's a robot," Polchik said. He kept his voice very flat. He was in no mood for further ribbing.

"Real he is, yeah? No kidding?" Rico's face always looked to Polchik like a brass artichoke, ready to be peeled. But he was friendly enough—and cooperative. It was a dunky neighborhood and Polchik had found Rico useful more than once. "What's he supposed to do, eh?"

"He's supposed to be a cop." Glum.

Rico shook his vegetable head. "What they gonna do next? Robots. So what happens t'you, Mike? They make you a detective?"

"Sure. And the week after that they make me captain."

Rico looked uncertain, didn't know whether he should laugh or sympathize. Finally, he said, "Hey, I got a bottle for ya," feeling it



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

would serve, whatever his reaction should properly have been. "Betcha your wife likes it . . . from Poland, imported stuff. Got grass or weeds or some kinda stuff in it. S'possed to be really sensational."

For just a second, peripherally seen, Polchik thought the robot had stirred.

"*Escuchar!* I'll get it for you."

He disappeared inside the bar before Polchik could stop him. The robot *did* move. It trembled . . . ?

Rico came out with a paper bag, its neck twisted closed around what was obviously a bottle of liquor.

"I'll have to pick it up tomorrow," Polchik said. "I don't have the car tonight."

"I'll keep it for you. If I'm on relief when you come by, ask Maldonado."

The robot was definitely humming. Polchik could hear it. (The sort of sound an electric watch makes.) It suddenly moved, closing the distance ten feet between them till it passed Polchik, swiveled to face Rico—who stumbled backward halfway to the entrance to the Amsterdam Inn—then swiveled back to face Polchik.

"Visual and audial data indicate a one-to-one extrapolation of same would result in a conclusion that a gratuity has been offered to you, Officer Polchik. Further, logic indicates that you intend to accept said gratuity. Such behavior is a programmed infraction of the law. It is, Officer Polchik, a very—"

"Shut up!"

Rico stood very close to the door, wide-eyed.

"I'll see you tomorrow night," Polchik said to him.

"Officer Polchik," the robot went on as though there had been no interruption, "it is clear, if you intend to accept a gratuity, you will be breaking the law and liable to arrest and prosecution under Law Officer Statutes number—"

"I said shuddup, dammit!" Polchik said, louder. "I don't even know what the hell you're talkin' about, but I said shuddup, and that's an *order!*"

"Yes, sir," the robot replied instantly. "However, my data tapes will record this conversation in its entirety and it will be transcribed into a written report at the conclusion of our patrol."

"What?" Polchik felt gears gnashing inside his head, thought of gears, thought of the robot, rejected gears and thought about Captain Summit. Then he thought about gears again . . . crushing him.

Rico's voice intruded, sounding scared. "What's he saying? What's that about a report?"

"Now wait a minute, Brillo," Polchik said, walking up to the robot. "Nothin's happened here you can write a report on."

The robot's voice—*Reardon's* voice, Polchik thought irritatedly—was very firm. "Logic in-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

dicates a high probability that a gratuity has been accepted in the past, and another will be accepted in the future."

Polchik felt chili peppers in his gut. Hooking his thumbs in his belt—a pose he automatically assumed when he was trying to avert trouble—he deliberately toned down his voice. "Listen, Brillo, you forget the whole thing, you understand. You just *forget* it."

"Am I to understand you desire my tapes to be erased?"

"Yeah, that's right. Erase it."

"Is that an order?"

"It's an order!"

The robot hummed to itself for a heartbeat, then, "Primary programming does not allow erasure of data tapes. Tapes can be erased only post-transcription, or by physically removing same from my memory bank."

"Listen—" Rico started, "I don't wan' no trub—"

Polchik impatiently waved him to silence. He didn't need any complications right now. "Now listen, Brillo . . ."

"Yes. I hear it."

Polchik was about to continue speaking. He stopped. *I hear it? This damned thing's gone bananas.* "I didn't say anything yet."

"Oh. I'm sorry, sir. I thought you were referring to the sound of a female human screaming on 84th Street, third floor front apartment."

Polchik looked everywhichway. "What are you *talkin'* about? You crazy or something?"

"No, sir. I am a model X-44. Though under certain special conditions my circuits can malfunction, conceivably, nothing in my repair programming parameters approximates 'crazy'."

"Then just shuddup and let's get this thing straightened out. Now, try'n understand this. You're just a robot, see. You don't understand the way real people do things. Like, for instance, when Rico here offers me a bottle of—"

"If you'll pardon me, sir, the female human is now screaming in the 17,000 cycle per second range. My tapes are programmed to value-judge such a range as concomitant with fear and possibly extreme pain. I suggest we act at once."

"Hey, Polchik . . ." Rico began.

"No, shuddup, Rico. Hey, listen, robot, Brillo, whatever: you mean you can *hear* some woman screaming, two blocks away and up three flights? Is the window open?" Then he stopped. "What'm I doin'? Talking to this thing!" He remembered the briefing he'd been given by Captain Summit. "O.K. You say you can hear her . . . let's find her."

The robot took off at top speed. Back into the alley behind the Amsterdam Inn, across the 82nd-83rd block, across the 83rd-84th block, full-out with no clanking or clatter-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ing. Polchik found himself pounding along ten feet behind the robot, then twenty feet, then thirty feet; suddenly he was puffing, his chest heavy, the riot-prod and the bullhorn and the extra clips of Needler ammunition flapping against his chest and back.

The robot emerged from the alley, turned a 90° angle with the sharpest cut Polchik had ever seen, and jogged up 84th Street. Brillo was caught for a moment in the glare of a street lamp, then was taking the steps of a crippled old brownstone three at a time.

Troglodytes with punch-presses were berkeleying Polchik's lungs and stomach. His head was a dissenter's punchboard. But he followed. More slowly now; and had trouble negotiating the last flight of stairs to the third floor. As he gained the landing, he was hauling himself hand-over-hand up the banister. *If God'd wanted cops to* walk *beats, he wouldn't'a created the growler!*

The robot, Brillo, X-44, was standing in front of the door marked 3-A. He was quivering like a hound on point. (Buzzing softly with the sort of sound an electric watch makes.) Now Polchik could hear the woman himself, above the roar of blood in his temples.

"Open up in there!" Polchik bellowed. He ripped the .32 Needle Positive off its Velcro fastener and banged on the door with the butt. The lanyard was twisted; he untwisted it. "This's the police. I'm demanding entrance to a private domicile under Public Law 22-809, allowing for supersedence of the 'home-castle' rule under emergency conditions. I said *open up in there!*"

The screaming went up and plateau'd a few hundred cycles higher, and Polchik snapped at the robot, "Get outta my way."

Brillo obediently moved back a pace, and in the narrow hallway Polchik braced himself against the wall, locked the exoskeletal rods on his boots, dropped his crash-hat visor, jacked up his leg and delivered a powerful *savate* kick at the door.

It was a pre-Slum Clear apartment. The door bowed and dust spurted from the seams, but it held. Despite the rods, Polchik felt a searing pain gash up through his leg. He fell back, hopping about painfully, hearing himself going, "oo . . . oo . . . oo" and then prepared himself to have to do it again. The robot moved up in front of him, said, "Excuse me, sir," and smoothly cleaved the door down the center with the edge of a metal hand that had somehow suddenly developed a cutting edge. He reached in, grasped both sliced edges of the hardwood, and ripped the door outward in two even halves.

"Oh." Polchik stared open-mouthed for only an instant.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

In an instant they were inside.

The unshaven man with the beer gut protruding from beneath his olive drab skivvy undershirt was slapping the hell out of his wife. She was half-lying over the back of a sofa with the springs showing. Her eyes were swollen and blue-black as dried prunes. One massive bruise was already draining down her cheek into her neck. She was weakly trying to fend off her husband's blows with ineffectual wrist-blocks.

"O.K.! That's it!" Polchik yelled.

The sound of another voice in the room with them brought the man and his wife to a halt. He turned his head, his left hand still tangled in her long black hair, and he stared at the two intruders.

He began cursing in Spanish. Then he burst into a guttural combination of English and Spanish, and finally slowed in his own spittle to a ragged English. ". . . Won't let me alone . . . go out my house . . . always botherin' won't let me alone . . . damn . . ." and he went back to Spanish as he pushed the woman from him and started across the room. The woman tumbled, squealing, out of sight behind the sofa.

The man stumbled crossing the room, and Polchik's needler tracked him. Behind him he heard the robot softly humming, and then it said, "Sir, analysis indicates psychotic glaze over subject's eyes."

The man grabbed a half-filled quart bottle of beer off the television set, smashed it against the leading edge of the TV, giving it a half-twist—which registered instantly in Polchik's mind: this guy knew how to get a ragged edge on the weapon; he was an experienced barroom brawler—and suddenly lurched toward Polchik with the jagged stump in his hand.

Abruptly, before Polchik could even thumb the needler to stun, a metal blur passed him, swept into the man, lifted him high in the air with one hand, turned him upside-down so the bottle, small plastic change and an unzipped shoe showered down onto the threadbare rug. Arms and legs fluttered helplessly.

"Aieeee!" the man screamed, his hair hanging down, his face plugged red with blood. *"Madre de Dios!"*

"Leave him alone!" It was the wife screaming, charging—if it could be called that, on hands and knees—from behind the sofa. She clambered to her feet and ran at the robot, screeching and cursing, pounding her work-reddened fists against his gleaming hide.

"O.K., O.K.," Polchik said, his voice lower but strong enough to get through to her. Pulling her and her hysteria away from the robot, he ordered, "Brillo, put him down."

"You cops got no right bustin' in here," the man started com-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

plaining the moment he was on his feet again. "You got a warrant? Huh? You gonna get in trouble, plenty trouble. This my home, cop, 'home is a man's castle', huh? Right? Right? An' you an' this tin can—" He was waving his arms wildly.

Brillo wheeled a few inches toward the man. The stream of abuse cut off instantly, the man's face went pale, and he threw up his hands to protect himself.

"This man can be arrested for assault and battery, failure to heed a legitimate police order, attempted assault on a police officer with a deadly weapon, and disturbing the peace," Brillo said. His flat, calm voice seemed to echo off the grimy walls.

"It . . . it's talkin'! Flavio! *Demonio!*" The wife spiraled toward hysteria again.

"Shall I inform him of his rights under the Public Laws, sir?" Brillo asked Polchik.

"You gon' arrest me? Whu'for?"

"Brillo—" Polchik began.

Brillo started again, "Assault and battery, failure to—"

Polchik looked annoyed. "Shuddup, I wasn't asking you to run it again. Just shuddup."

"I din't do nothin'! You come bust t'rough my door when me an' my wife wass arguin', an' you beat me up. Look'a the bruise on my arm." The arm was slightly inflamed where Brillo had grabbed him.

"Flavio!" the woman whimpered.

"Isabel; *callete la boca!*"

"I live right downstairs," a voice said from behind them. "He's always beating her up, and he drinks all the time." Polchik spun and a man in Levis and striped pajama tops was standing in the ruined doorway.

"Get outta here!" Polchik bellowed, and the man vanished.

"I din't do nothin'!" Flavio said again, semi-surly.

"My data tapes," Brillo replied evenly, "will clearly show your actions."

"Day to tapes? Whass he talkin' 'bout?" Flavio turned to Polchik, an unaccustomed ally against the hulking machine. Polchik felt a sense of camaraderie with the man.

"He's got everything down recorded . . . like on TV. And sound tapes, too." Polchik looked back at him and recognized something in the dismay on the man's fleshy face.

Brillo asked again, "Shall I inform him of his rights, sir?"

"Officer, sir, you ain' gonna'rrest him?" the woman half-asked, half-pleaded, her eyes swollen almost closed, barely open, but tearful.

"He came after me with a bottle," Polchik said. "And he didn't do you much good, neither."

"He wass work op. Iss all right. He's O.K. now. It wass joss a'argumen'. Nobody got hurt."

Brillo's hum got momentarily



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

higher. "Madam, you should inspect your face in my mirror." He hummed and his skin became smoothly reflective. "My sensors detect several contusions and abrasions, particularly—"

"Skip it," Polchik said abruptly. "Come on, Brillo, let's go."

Brillo's metal hide went blank again. "I have not informed the prisoner—"

"No prisoner," Polchik said. "No arrest. Let's go."

"But the data clearly shows—"

"Forget it!" Polchik turned to face the man; he was standing there looking uncertain, rubbing his arm. "And you, strongarm . . . lemme hear one more peep outta this apartment and you'll be in jail so fast it'll make your head swim . . . and for a long time, too. If you get there at all. We don't like guys like you. So I'm puttin' the word out on you . . . I don't like guys comin' at me with bottles."

"Sir . . . I—"

"Come on!"

The robot followed the cop and the apartment was suddenly silent. Flavio and Isabel looked at each other sheepishly, then he began to cry, went to her and touched her bruises with the gentlest fingers.

They went downstairs, Polchik staring and trying to figure out how it was such a massive machine could navigate the steps so smoothly. Something was going on at the base of the robot, but Polchik couldn't get a good view of it. Dust puffed out from beneath the machine. And something sparkled.

Once on the sidewalk, Brillo said, "Sir, that man should have been arrested. He was clearly violating several statutes."

Polchik made a sour face. "His wife wouldn't of pressed the charge."

"He attacked a police officer with a deadly weapon."

"So that makes him Mad Dog Coll? He's scared witless, in the future he'll watch it—for a while, at least."

Brillo was hardly satisfied at this non-computable conclusion. "A police officer's duty is to arrest persons who are suspected of having broken the law. Civil or criminal courts have the legal jurisdiction to decide the suspect's guilt or innocence. Your duty, sir, was to arrest that man."

"Sure, sure. Have it *your* way, half the damn city'll be in jail, and the other half'll be springin' 'em out."

Brillo said nothing, but Polchik thought the robot's humming sounded sullen. He had a strong suspicion the machine wouldn't forget it. Or Rico, either.

And further up the street, to cinch Polchik's suspicion, the robot once more tried to reinforce his position. "According to the Peace Officer Responsibility Act of 1972, failure of an officer to take into custody person or persons in-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

disputably engaged in acts that contravene—"

"Awright, dammit, knock it off. I tole you why I didn't arrest that poor jughead, so stop bustin' my chops with it. You ain't happy, you don't like it, tell my sergeant!"

*Sergeant, hell,* Polchik thought. *This stuff goes right to Captain Summit, Santorini and the commissioner. Probably the mayor; who the hell knows?*

Petulantly—it seemed to Polchik—the robot resumed: "Reviewing my tapes, I find the matter of the bottle of liquor offered as a gratuity still unresolved. If I am to—"

Polchik spun left and kicked with all his might at a garbage can bolted to an iron fence. The lid sprang off and clanged against the fence at the end of its short chain. "I've had it with you . . . you nonreturnable piece of scrap metal!" He wanted very much to go on, but he didn't know what to say. All he knew for certain was that he'd never had such a crummy night in all his life. It *couldn't* just be this robot—staring back blankly. It was *every*thing. The mortgage payment was due; Benjy had to go in to the orthodontist and where the hell was the money going to come from for *that*. Dorothy had called the precinct just before he'd come down, to tell him the hot water heater had split and drowned the carpets in the kid's bedroom. To top it all off, he'd been assigned this buzzing pain in the neck and got caught with a little oil passed by that nitwit Rico. And then this Brillo had to tell him there was a hassle two blocks away. He was sure, as God made little green apples, going to get a bad report out of this, maybe get set down, maybe get reprimanded . . . he didn't know what all.

But one thing was certain: this metal bird dog, this stuffed shirt barracks lawyer with the trailalong of a ten-year-old kid behind his big brother, this nuisance in metal underwear, this . . . this . . . *thing* was of no earthly use to a working cop pulling a foot beat!

*On the other hand,* a voice that spoke with the voice of Mike Polchik said, *he* did *keep that jughead from using a broken bottle on you.*

"Shuddup!" Polchik said.

"I beg your pardon?" answered the robot.

*Ingrate!* said the inner voice.

It was verging on that chalky hour before dawn, when the light filtering out of the sky had a leprous, sickly look. Mike Polchik was a much older man.

Brillo had interfered in the apprehension of Milky Kyser, a well-known car thief. Mike had spotted him walking slowly and contemplatively along a line of parked cars on Columbus Avenue, carrying a tightly-rolled copy of the current issue of *Life* magazine.

When he had collared Milky, the



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

robot had buzzed up to them and politely inquired precisely what in the carborundum Polchik thought he was doing. Polchik had responded with what was becoming an hysterical reaction-formation to *anything* the metal cop said. "Shuddup!"

Brillo had persisted, saying he was programmed to protect the civil rights of the members of the community, and as far as he could tell, having "scanned all data relevant to the situation at hand," the gentleman now dangling from Polchik's grip was spotlessly blameless of even the remotest scintilla of wrongdoing. Polchik had held Milky with one hand and with the other gesticulated wildly as he explained, "Look, dimdumb, this is Milky Kyser, AKA Irwin Kayser, AKA Clarence Irwin, AKA Jack Milk, AKA God Knows Who All. He is a well-known dip and car thief, and he will use that rolled-up copy of the magazine to jack-and-snap the door handle of the proper model car, any number of which is currently parked, you will note, along this street . . . unless I arrest him! Now will you kindly get the hell outta my hair and *back off?*"

But it was no use. By the time Brillo had patiently repeated the civil rights story, reiterated pertinent sections of the Peace Officer Responsibility Act of 1972 and topped it off with a précis of the Miranda-Escobedo-Baum Supreme Court decision so adroit and simplified even a confirmed tautologist would have applauded, Milky himself—eyes glittering and a sneer that was hardly a smile on his ferret face—was echoing it, word for word.

The robot had given Milky a thorough course in legal cop-outs, before Polchik's dazed eyes.

"Besides," Milky told Polchik, with as much dignity as he could muster, hanging as he was from the cop's meaty fist, "I ain't done nuthin', and just because I been busted once or twice . . ."

*"Once or twice!"* Polchik yanked the rolled-up magazine out of Milky's hand and raised it to clobber him. Milky pulled in his head like a turtle, wincing.

But in that fraction of a second, Polchik suddenly saw a picture flashed on the wall of his mind. A picture of Desk Sergeant Loyo and Captain Summit and Chief Santorini and the mayor's toady and that silent FBI man, all watching a TV screen. And on the screen, there was the pride of the Force, Officer Mike Polchik beaning Milky Kyser with a semi-lethal copy of *Life* magazine.

Polchik held the magazine poised, trembling with the arrested movement. Milky, head now barely visible from between his shoulders, peeped up from behind his upraised hands. He looked like a mole.

"Beat it," Polchik growled. "Get out of this precinct, Milky. If you're spotted around here again,



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

you're gonna get busted. And don't stop to buy no magazines."

He let Milky loose.

The mole metamorphosed into a ferret once more. And straightening himself, he said, "An' don't call me 'Milky' anymore. My given name is Irwin."

"You got three seconds t'vanish from my sight!"

Milky *née* Irwin hustled off down the street. At the corner he stopped and turned around. He cupped his hands and yelled back, "Hey, robot . . . thanks!"

Brillo was about to reply, when Polchik bellowed, "Will you *please!*" The robot turned and said, very softly in Reardon's voice, "You are still holding Mr. Kyser's magazine."

Polchik was weary. Infinitely weary. "You hear him askin' for it?" He walked away from the robot and, as he passed a sidewalk dispenser, stepped on the dispodpedal, and flipped the magazine into the receptacle.

"I saved a piece of cherry pie for you, Mike," the waitress said. Polchik looked up from his uneaten hot—now cold—roast beef sandwich and French fries. He shook his head.

"Thanks anyway. Just another cuppa coffee."

The waitress had lost her way somewhere beyond twenty-seven. She was a nice person. She went home to her husband every morning. She didn't fool around. Extra mates under the new lottery were not her interest; she just didn't fool around. But she liked Mike Polchik. He, too, was a nice person.

"What's the matter, Mike?"

Polchik looked out the window of the diner. Brillo was standing directly under a neon street lamp. He couldn't hear it from here, but he was sure the thing was buzzing softly to itself—with the sort of sound an electric watch makes.

"Him."

"That?" the waitress looked past him.

"Uh-uh. *Him.*"

"What is it?"

"My shadow."

"Mike, you O.K.? Try the pie, huh? Maybe a scoop of nice vanilla ice cream on top."

"Onita, please. Just a cuppa coffee. I'm fine. I got problems." He stared down at his plate again.

She looked at him for a moment longer, worried, then turned and returned the pie on its plate to the empty space behind the smudged glass of the display case. "You want fresh?" she asked.

When he didn't answer, she shrugged and came back, using the coffee siphon on the portable cart to refill his cup.

She lounged behind the counter, watching her friend, Mike Polchik, as he slowly drank his coffee; and every few minutes he'd look out at that metal thing on the corner under the street lamp.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

When he rose from the booth and came to the counter, she thought he was going to apologize, or speak to her, or something, but all he said was, "You got my check?"

"What check?"

"Come on."

"Oh, Mike, what's wrong with you?"

"I want to pay the check, you mind?"

"Mike, almost . . . what . . . five years you've been eating here and have you ever been asked to pay a check?"

Polchik looked very tired. "Tonight I pay the check. Come on . . . I gotta get back on the street. He's waiting."

There was a strange look in his eyes and she didn't want to ask which "he" Polchik meant. She was afraid he meant the metal thing out there. Onita didn't like strange, new things that waited under street lamps. She hastily wrote out a check and slid it across the plasteel to him. He pulled change from a pocket, paid her, turned, seemed to remember something, turned back, added a tip, then swiftly left the diner.

She watched through the glass as he went up to the metal thing. Then the two of them walked away, Mike leading, the thing following.

Onita made fresh. It was a good thing she had done it so many times she could do it by reflex, without thinking. Hot coffee scalds are very painful.

At the corner, Polchik saw a car weaving toward the intersection—a Ford Electric; convertible, four years old. Still looked flashy. Top down. He could see a bunch of long-haired kids inside. He couldn't tell the girls from the boys. It bothered him.

Polchik stopped. They weren't going fast, but the car was definitely weaving as it approached the intersection. *The warrior-lizard,* he thought. It was almost an unconscious directive. He'd been a cop long enough to react to the little hints, the flutters, the inclinations, the hunches.

Polchik stepped out from the curb, unshipped his gumball from his belt and flashed the red light at the driver. The car slowed even more; now it was crawling.

"Pull it over, kid!" he shouted.

For a moment he thought they were ignoring him, that the driver might not have heard him, that they'd try and make a break for it . . . that they'd speed up and sideswipe him. But the driver eased the car to the curb and stopped.

Then he slid sidewise, pulled up his legs and crossed them neatly at the ankles. On the top of the dashboard.

Polchik walked around to the driver's side. "Turn it off. Everybody out."

There were six of them. None of



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

them moved. The driver closed his eyes slowly, then tipped his Irkutsk fur hat over his eyes till it rested on the bridge of his nose. Polchik reached into the car and turned it off. He pulled the keys.

"Hey! Whuzzis all about?" one of the kids—a boy with terminal acne—in the back seat complained. His voice began and ended on a whine. Polchik re-stuck the gumball.

The driver looked up from under the fur. "Wasn't breaking any laws." He said each word very slowly, very distinctly, as though each one was on a printout.

And Polchik knew he'd been right. They were on the lizard.

He opened the door, free hand hanging at the needler. "Out. All of you, out."

Then he sensed Brillo lurking behind him, in the middle of the street. Good. *Hope a garbage truck hits him.*

He was getting mad. That wasn't smart. Carefully, he said, "Don't make me say it again. Move it!"

He lined them up on the sidewalk beside the car, in plain sight. Three girls, three guys. Two of the guys with long, stringy hair and the third with a scalplock. The three girls wearing tammy cuts. All six sullen-faced, drawn, dark smudges under the eyes. The lizard. But good clothes, fairly new. Money. He couldn't just hustle them, he had to be careful.

"O.K., one at a time, empty your pockets and pouches onto the hood of the car."

"Hey, we don't haveta do that just because—"

"Do it!"

"Don't argue with the pig," one of the girls said, lizard-spacing her words carefully. "He's probably trigger happy."

Brillo rolled up to Polchik. "It is necessary to have a probable cause clearance from the precinct in order to search, sir."

"Not on a stop'n'frisk," Polchik snapped, not taking his eyes off them. He had no time for nonsense with the can of cogs. He kept his eyes on the growing collection of chits, change, code keyes, combs, nail files, toke pipes and miscellanea being dumped on the Ford's hood.

"There must be grounds for suspicion even in a spot search action, sir," Brillo said.

"There's grounds. Narcotics."

"Nar . . . you must be outtayer mind," said the one boy who slurred his words. He was working something other than the lizard.

"That's a pig for you," said the girl who had made the trigger happy remark.

"Look," Polchik said, "you're not from around here. Odds are good if I run b&b tests on you, we'll find you're under the influence of the lizard."

"Heyyyy!" the driver said. "The *what?*"



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Warrior-lizard," Polchik said.

"Oh, ain't he the jive thug," the smartmouth girl said. "He's a word user. I'll bet he knows *all* the current rage phrases. A philologist. I'll bet he knows *all* the solecisms and colloquialisms, catch phrases, catachreses, nicknames and vulgarisms. The 'warrior-lizard', indeed."

*College kids,* Polchik fumed inwardly. *They* always *try to make you feel stupid; I coulda gone to college—if I didn't have to work. Money, they probably* always *had money.*

The driver giggled. "Are you trying to tell me, Mella, my dear, that this officer is accusing us of being under the influence of the illegal Bolivian drug commonly called Guerrera-Tuera?" He said it with pinpointed scorn, pronouncing the Spanish broadly: gwuh-*rare*-uh too-*err*-uh.

Brillo said, "Reviewing my semantic tapes, sir, I find no analogs for 'Guerrera-Tuera' as 'warrior-lizard.' True, *guerrero* in Spanish means *warrior,* but the closest spelling I find is the feminine noun *guerra,* which translates as *war.* Neither *guerrera* nor *tuera* appear in the Spanish language. If *tuera* is a species of lizard, I don't seem to find it—"

Polchik had listened dumbly. The weight on his shoulders was monstrous. All of them were on him. The kids, that lousy stinking robot—they were making fun, such fun, such *damned* fun of him!

"Keep digging," he directed them. He was surprised to hear his words emerge as a series of croaks.

"And blood and breath tests must be administered, sir—"

"Stay the hell outta this!"

"We're on our way home from a party," said the boy with the scalplock, who had been silent till then. "We took a shortcut and got lost."

"Sure," Polchik said. "In the middle of Manhattan, you got lost." He saw a small green bottle dumped out of the last girl's pouch. She was trying to push it under other items. "What's that?"

"Medicine," she said. Quickly. Very quickly.

Everyone tensed.

"Let me see it." His voice was even.

He put out his hand for the bottle, but all six watched his other hand, hanging beside the needler. Hesitantly, the girl picked the bottle out of the mass of goods on the car's hood, and handed him the plastic container.

Brillo said, "I am equipped with chemical sensors and reference tapes in my memory bank enumerating common narcotics. I can analyze the suspected medicine."

The six stared wordlessly at the robot. They seemed almost afraid to acknowledge its presence.

Polchik handed the plastic bottle to the robot.

Brillo depressed a color-coded key on a bank set flush into his left



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

forearm, and a panel that hadn't seemed to be there a moment before slid down in the robot's chest. He dropped the plastic bottle into the opening and the panel slid up. He stood and buzzed.

"You don't have to open the bottle?" Polchik asked.

"No, sir."

"Oh."

The robot continued buzzing. Polchik felt stupid, just standing and watching. After a few moments the kids began to smirk, then to grin, then to chuckle openly, whispering among themselves. The smartmouth girl giggled viciously. Polchik felt fifteen years old again; awkward, the butt of secret jokes among the long-legged high school girls in their miniskirts who had been so terrifyingly aloof he had never even considered asking them out. He realized with some shame that he despised these kids with their money, their cars, their flashy clothes, their dope. And most of all, their assurance. *He*, Mike Polchik, had been working hauling sides of beef from the delivery trucks to his old man's butcher shop while others were tooling around in their Electrics. He forced the memories from his mind and took out his anger and frustration on the metal idiot still buzzing beside him.

"O.K., O.K., how long does it take you?"

*"Tsk-tsk,"* said the driver, and went cross-eyed.

Polchik ignored him. But not very well.

"I am a mobile unit, sir. Experimental model 44. My parent mechanism—the Master Unit AA—at Universal Electronics laboratories is equipped to perform this function in under one minute."

"Well, hurry it up. I wanna run these hairies."

"Gwuh-*rare*-uh too-*err*-uh," the scalplock said in a nasty undertone.

There was a soft musical tone from inside the chest compartment, the plate slid down again, and the robot withdrew the plastic bottle. He handed it to the girl.

"*Now* whaddaya think you're doing?"

"Analysis confirms what the young lady attested, sir. This is a commonly prescribed nose drop for nasal congestion and certain primary allergies."

Polchik was speechless.

"You are free to go," the robot said. "With our apologies. We are merely doing our jobs. Thank you."

Polchik started to protest—he *knew* he was right—but the kids were already gathering up their belongings. He hadn't even ripped the car, which was probably where they had it locked away. But he knew it was useless. *He* was the guinea pig in this experiment, not the robot. It was all painfully clear. He knew if he interfered, if he overrode the robot's decision, it would only add to the cloud under



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

which the robot had put him: short temper, taking a gift from a neighborhood merchant, letting the robot outmaneuver him in the apartment, false stop on Kyser . . . and now this. Suddenly, all Mike Polchik wanted was to go back, get out of harness, sign out, and go home to bed. Wet carpets and all.

Because if these metal things were what was coming, he was simply too tired to buck it.

He watched as the kids—hooting and ridiculing his impotency—piled back in the car, the girls showing their legs as they clambered over the side. The driver burned polyglas speeding up Columbus Avenue. In a moment they were gone.

"You see, Officer Polchik," Brillo said, "false arrest would make us both liable for serious—" But Polchik was already walking away, his shoulders slumped, the weight of his five years on the force too much for him.

The robot—making the sort of sound an electric watch makes—hummed after him, keeping stern vigil on the darkened neighborhood in the encroaching dawn. He could not compute despair. But he had been built to serve. He was programmed to protect, and he did it, all the way back to the precinct house.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Polchik was sitting at a scarred desk in the squad room, laboriously typing out his report on a weary IBM Selectric afflicted with grand mal. Across the room Reardon poked at the now-inert metal bulk of Brillo, using some sort of power tool with a teardrop-shaped lamp on top of it. The mayor's whiz kid definitely looked sandbagged. *He don't go without sleep very often,* Polchik thought with grim satisfaction.

The door to Captain Summit's office opened, and the captain, looking oceanic and faraway, waved him in.

"Here it comes," Polchik said to himself.

Summit let Polchik pass him in the doorway. He closed the door and indicated the worn plastic chair in front of the desk. Polchik sat down. "I'm not done typin' the beat report yet, Capt'n."

Summit ignored the comment. He moved over to the desk, picked up a yellow printout flimsy, and stood silently for a moment in front of Polchik, carefully considering it.

"Accident report out of the 86th precinct uptown. Six kids in a Ford Electric convertible went out of control, smashed down a pedestrian and totaled against the bridge abutment. Three dead, three critical—not expected to live. And only Fifteen minutes after you let them go."

Dust.

Dried out.

Ashes.

Gray. Final.

Polchik couldn't think. Tired. Confused. Sick. Six kids. Now they were kids, just kids, nothing else made out of old bad memories.

"One of the girls went through the windshield. D.O.A. Driver got the steering column punched out through his back. Another girl with a snapped neck. Another girl—"

He couldn't hear him. He was somewhere else, faraway. Kids. Laughing, smartmouth kids having a good time. Benjy would be that age some day. The carpets were all wet.

"Mike!"

He didn't hear.

"Mike! Polchik!"

He looked up. There was a stranger standing in front of him holding a yellow flimsy.

"Well, don't just sit there, Polchik. You *had* them! Why'd you let them go?"

"The . . . lizard—"

"That's right, that's what five of them were using. Three beakers of it in the car. And a dead cat on the floor and all the makings wrapped in foam-bead bags. You'd have had to be blind to miss it all!"

"The robot—"



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Summit turned away with disgust, slamming the report onto the desk top. He thumbed the call-button. When Desk Sergeant Loyo came in, he said, "Take him upstairs and give him a breather of straightener, let him lie down for half an hour, then bring him back to me."

Loyo got Polchik under the arms and took him out.

Then the captain turned off the office lights and sat silently in his desk chair, watching the night die just beyond the filthy windows.

"Feel better?"

"Yeah; thank you, Capt'n. I'm fine."

"You're back with me all the way? You understand what I'm saying?"

"Yeah, sure. I'm just *fine*, sir. It was just . . . those kids—"

"So why'd you let them go? I've got no time to baby you, Polchik. You're five years a cop and I've got all the brass in town outside that door waiting. So get right."

"I'm right, Capt'n. I let them go because the robot took the stuff the girl was carrying, and he dumped it in his thing there, and tol me it was nose drops."

"Not good enough, Mike."

"What can I say besides that?"

"Well, dammit *Officer* Polchik, you better say *some*thing besides that. You know they run that stuff right into skull, you've been a cop long enough to see it, to hear it the way they talk! Why'd you let them custer you?"

"What was I going to run them in for? Carrying nose drops? With that motherin' robot reciting civil rights chapter-an'-verse at me every step of the way? O.K., so I tell the robot to get lost, and I bust 'em and bring 'em in. In an hour they're out again and I've got a false arrest lug dropped on me. Even if it *ain't* nose drops. And they can use the robot's tapes to hang me up by the thumbs!"

Summit dropped back into his chair, sack weight. His face was a burned-out building. "So we've got three, maybe six kids dead." He shook his head.

Polchik wanted to make him feel better. But how did you do that? "Listen, Capt'n, you know I would of had those kids in here so fast it'd'of made their heads swim . . . if I'd of been on my own. That robot . . . well, it just didn't work out. Capt'n, listen, I'm not trying to alibi, it was hell out there. You were a beat cop . . . *you* know a cop ain't a set of rules and pile of wires. Guys like me just can't work with things like that Brillo. It won't work, Capt'n. A guy's gotta be free to use his judgment, to feel like he's worth somethin', not just a piece of—"

Summit's head came up sharply. "Judgment!" He looked as though he wanted to vomit. "What kind of judgment are you showing with that Rico over at the Amsterdam



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Inn? And all of it on the tapes, sound, pictures, everything!"

"Oh. That."

"Yes, that. You're lucky I insisted those tapes be held strictly private, for the use of the Force only. I had to invoke privileged data. Do you have any *idea* how many strings that puts on me, on this office now, with the chief, with the commissioner, with the mayor? Do you have any *idea,* Polchik?"

"No, sir. I'm sorry." Chagrin.

"Sorry doesn't buy it! I don't want you taking any oil from anywhere. No bottles, no gifts, no *nothing*, not from *any*body. Have you got that?"

"Yes, sir."

Wearily, Summit persisted. "It's tough enough to do a job here without having special graft investigations and the D.A.'s squad sniffing all over the precinct. Polchik, do you have any *idea* . . .!" He stopped, looked levelly at the patrolman and said, "One more time and you're out. Not set down, not reprimanded, not docked—*out*. All the way out. *Kapish?*"

Polchik nodded; his back was broken.

"I've got to set it right."

"What, sir?"

"You, that's what."

Polchik waited. A pendulum was swinging.

"I'll have to think about it. But if it hadn't been for the five good years you've given me here, Polchik . . . well, you'll be getting punishment, but I don't know just what yet."

"Uh, what's gonna happen with the robot?"

Summit got to his feet slowly; mooring a dirigible. "Come on outside and you'll see."

Polchik followed him to the door, where the captain paused. He looked closely into Polchik's face and said, "Tonight has been an education, Mike."

There was no answer to that one.

They went into the front desk room. Reardon still had his head stuck into Brillo's open torso cavity, and the whiz kid was standing tiptoed behind him, peering over the engineer's shoulder. As they entered the Ready room, Reardon straightened and clicked off the lamp on the power tool. He watched Summit and Polchik as they walked over to Chief Santorini. Summit murmured to the chief for a moment, then Santorini nodded and said, "We'll talk tomorrow, then."

He started toward the front door, stopped and said, "Good night, gentlemen. It's been a long night. I'll be in touch with your offices tomorrow." He didn't wait for acknowledgment; he simply went.

Reardon turned around to face Summit. He was waiting for words. Even the whiz kid was starting to come alive again. The silent FBI man rose from the bench—as far



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

as Polchik could tell, he hadn't changed position all the time they'd been gone on patrol—and walked toward the group.

Reardon said, "Well—" His voice trailed off.

The pendulum was swinging.

"Gentlemen," said the captain, "I've advised Chief Santorini I'll be writing out a full report to be sent downtown. My recommendations will more than likely decide whether these robots will be added to our Force."

"Grass roots level opinion, very good, Captain, very good," said the whiz kid. Summit ignored him.

"But I suppose I ought to tell you right now my recommendations will be negative. As far as I'm concerned, Mr. Reardon, you still have a long way to go with your machine."

"But, I thought—"

"It did very well," Summit said, "don't get me wrong. But I think it's going to need a lot more flexibility and more knowledge of the police officer's duties before it can be of any real aid in our work."

Reardon was angry, but trying to control it. "I programmed the entire patrolman's manual, and all the City codes, and the Supreme Court—"

Summit stopped him with a raised hand. "Mr. Reardon, that's the least of a police officer's knowledge. *Anybody* can read a rule book. But *how to use those rules,* how to make those rules work in the street, that takes more than programming. It takes, well, it takes training. And experience. It doesn't come easily. A cop isn't a set of rules and a pile of wires."

Polchik was startled to hear his words. He knew it would be O.K. Not as good as before, but at least O.K.

Reardon was furious now. And he refused to be convinced. Or perhaps he refused to allow the mayor's whiz kid and the FBI man to be so easily convinced. He had worked too long and at too much personal cost to his career to let it go that easily. He hung onto it. "But merely training shouldn't put you off the X-44 *completely!*"

The captain's face tensed around the mouth. "Look, Mr. Reardon, I'm not very good at being politic—which is why I'm still a captain, I suppose"—the whiz kid gave him a be-careful look, but the captain went on—"but it isn't merely training. This officer is a good one. He's bright, he's on his toes, he maybe isn't Sherlock Holmes but he knows the feel of a neighborhood, the smell of it, the heat level. He knows every August we're going to get the leapers and the riots and some woman's head cut off and dumped in a mailbox mailed C.O.D. to Columbus, Ohio. He knows when there's racial tension in our streets. He knows when those poor slobs in the tenements have just *had it.* He knows when some new kind of vice has moved



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

in. But he made more mistakes out there tonight than a rookie. Five years walking and riding that beat, he's *never* foulballed the way he did tonight. Why? I've got to ask *why?* The only thing different was that machine of yours. *Why* did Mike Polchik foulball so tonight? *He* knew those kids in that car should have been run in for b&b or naline tests. So why, Mr. Reardon . . . *why?*"

Polchik felt lousy. The captain was more worked up than he'd ever seen him. But Polchik stood silently, listening; standing beside the silent, listening FBI man.

Brillo merely stood silently. Turned off.

Then why did he still hear that robot buzzing?

"It isn't rules and regs, Mr. Reardon." The captain seemed to have a lot more to come. "A moron can learn those. But how do you evaluate the look on a man's face that tells you he needs a fix? How do you gauge the cultural change in words like 'custer' or 'grass' or 'high' or 'pig'? How do you know when *not* to bust a bunch of kids who've popped a hydrant so they can cool off? How do you program all of *that* into a robot . . . and know that it's going to change from hour to hour?"

"We can do it! It'll take time, but we can do it."

The captain nodded slowly. "Maybe you can."

"I know we can," Reardon insisted.

"O.K., I'll even go for that. Let's say you can. Let's say you can get a robot that'll act like a human being and still be a robot . . . because that's what we're talking about here. There's still something else."

"Which is?"

"People, Mr. Reardon. People like Polchik here. I asked you *why* Polchik foulballed, why he made such a bum patrol tonight that I'm going to have to take disciplinary action against him *for the first time in five years* . . . so I'll *tell* you why, Mr. Reardon, about people like Polchik here. They're still afraid of machines, you know. We've pushed them and shoved them and lumbered them with machines till they're afraid the next clanking item down the pike is going to put them on the bread line. So they don't *want* to cooperate. They don't do it on purpose. They may not even *know* they're doing it, hell, I don't think Polchik knew what was happening, why he was falling over his feet tonight. You can get a robot to act like a human being, Mr. Reardon. Maybe you're right and you *can* do it, just like you said. But how the hell are you going to get humans to act like robots and not be afraid of machines?"

Reardon looked as whipped as Polchik felt.

"May I leave Brillo here till



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

morning? I'll have a crew come over from the labs and pick him up."

"Sure," the captain said, "he'll be fine right there against the wall. The desk sergeant'll keep an eye on him." To Loyo he said, "Sergeant, instruct your relief."

Loyo smiled and said, "Yes, sir."

Summit looked back at Reardon and said, "I'm sorry."

Reardon smiled wanly, and walked out. The whiz kid wanted to say something, but too much had already been said, and the captain looked through him. "I'm pretty tired, Mr. Kenzie. How about we discuss it tomorrow after I've seen the chief?"

The whiz kid scowled, turned and stalked out.

The captain sighed heavily. "Mike, go get signed out and go home. Come see me tomorrow. Late." He nodded to the FBI man, who still had not spoken, then he went away.

The robot stood where Reardon had left him. Silent.

Polchik went upstairs to the locker room to change.

Something was bothering him. But he couldn't nail it down.

When he came back down into the muster room, the FBI man was just racking the receiver on the desk blotter phone. "Leaving?" he asked. It was the first thing Polchik had heard him say. It was a warm brown voice.

"Yeah. Gotta go home. I'm whacked out." Polchik looked it.

"Can't say I blame you. I'm a little tired myself. Need a lift?"

"No, thanks," Polchik said. "I take the subway. Two blocks from the house." They walked out together. Polchik thought about wet carpets waiting. They stood on the front steps for a minute, breathing in the chill morning air, and Polchik said, "I feel kinda sorry for that chunk of scrap now. He did a pretty good job."

"But not good enough," the FBI man added.

Polchik felt suddenly very protective about the inert form against the wall in the precinct house. "Oh, I dunno. He saved me from getting clobbered, you wanna know the truth. Tell me . . . you think they'll ever build a robot that'll cut it?"

The FBI man lit a cigarette, blew smoke in a thin stream, and nodded. "Yeah. Probably. But it'll have to be a lot more sophisticated than old Brillo in there."

Polchik looked back through the doorway. The robot stood alone, looking somehow helpless. Waiting for rust. Polchik thought of kids, all kinds of kids, and when he was a kid. *It must be hell,* he thought, *being a robot. Getting turned off when they don't need you no more.*

Then he realized he could *still* hear that faint electrical buzzing. The kind a watch makes. He



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

cast a quick glance at the FBI man but, trailing cigarette smoke, he was already moving toward his car, parked directly in front of the precinct house. Polchik couldn't tell if he was wearing a watch or not.

He followed the government man.

"The trouble with Brillo," the FBI man said, "is that Reardon's facilities were too limited. But I'm sure there are other agencies working on it. They'll lick it one day." He snapped the cigarette into the gutter.

"Yeah, sure," Polchik said. The FBI man unlocked the car door and pulled it. It didn't open.

"Damn it!" he said. "Government pool issue. Damned door always sticks." Bunching his muscles, he suddenly wrenched at it with enough force to pop it open. Polchik stared. Metal had ripped.

"You take care of yourself now, y'hear?" the FBI man said, getting into the car. He flipped up the visor with its OFFICIAL GOVERNMENT BUSINESS card tacked to it, and slid behind the steering wheel.

The car settled heavily on its springs, as though a ton of lead had just been dumped on the front seat. He slammed the door. It was badly sprung.

"Too bad we couldn't use him," the FBI man said, staring out of the car at Brillo, illuminated through the precinct house doorway. "But . . . too crude."

"Yeah, sure, I'll take care of myself," Polchik replied, one exchange too late. He felt his mouth hanging open.

The FBI man grinned, started the car, and pulled away.

Polchik stood in the street, for a while.

Sometimes he stared down the early morning street in the direction the FBI man had taken.

Sometimes he stared at the metal cop immobile in the muster room.

And even as the sounds of the city's new day rose around him, he was not at all certain he did not still hear the sound of an electric watch. Getting louder. ■

**top sales executives only.**

**want an unusual career?**

Get the inside story on being a representative of an overseas bank by investing $15 in a copy of "Foreign Banking in the United States" from Management International Limited, Place Ville Marie, Montreal, Quebec, Canada.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

# the reference library

*P. Schuyler Miller*

## THE NEW YAHOOS

I don't know when "Gulliver's Travels" was first bowdlerized into a children's fantasy. I suspect most of us were in college before we discovered what Jonathan Swift had really written. Still later, a few missionaries baptized the book into the fellowship of pioneering science fiction. Certainly Swift pioneered in some of the techniques that became essential in later science fiction—contrasts of size in the Lilliput and Brobdingnag voyages, nincompoop scientists whose bizarre inventions sometimes work in the visit to Laputa, and "aliens"—intelligent nonhumans who just may be smarter than "civilized" men—in the first voyage to the Houyhnhnms.

This last episode was a particularly savage dissection of everything that is unlovable about human beings, who bear an unmistakable resemblance to the Yahoos who were the bestial slaves of the genteel horses. Liberals, intellectuals and students in general have long chortled over the unlovely behavior Gulliver reported. They are not going to be so happy about the discovery that Gulliver returned to the island of the Houyhnhnms and found that both Yahoos and horses had undergone a process of social upheaval remarkably like the one that is taking place in our own time. It is one thing to watch Dean Swift tear strips of bleeding hide off "them." It is quite different to feel the lash yourself.

"A New Voyage to the Country of the Houyhnhnms" (G. P. Putnam's Sons; 1970; 91 pp.; $2.95) purports to be the unpublished account of Gulliver's fifth voyage, which its editor, Matthew Hodgart, found in a Dublin attic. Dr. Hodgart is an English student of Eighteenth Century literature who taught last year at Cornell, and he has annotated Gulliver's account with some topical references to events he witnessed there or heard of through scholarly channels.

You may recall that when Gulliver returned to England he could not help seeing his neighbors and associates as Yahoos. He had been expelled from the land of the genteel horses, but the longing for their civilized society was too much to withstand, and in the end he found a ship that would take him



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

back. Alas, that quiet land had changed!

A ferment seemed to be seething in the blood of the stolid Yahoos. They had quit their work in the Houyhnhnms' fields. They had developed their own music and "fine" arts. They had discovered the enchantment of unnegotiable demands.

For some of these activities, the scholarly Dr. Hodgart finds counterparts in our day, even as Gulliver found that the Yahoos mirrored his Europe and England. He points out gravely that the student exhibitions of "soft sculpture" at Cornell and elsewhere in 1969 have similarities to the work of the New Yahoo artist who "makes a collection of Turds, which are evidently chosen for their significant Forms, and arranges them carefully in Niches of the Rocks." (Horse turds were specially prized for their squarish shape.)

Making his way back from the Yahoos' den to the company of his former masters, Gulliver found that ferment was also disturbing the horses society. Their foals found the New Yahoos' actions entrancing and exciting, and some of their philosophers—who in Gulliver's day included their scientists—applauded and extolled the innovations of the former beasts of burden. To explain and describe the situation they had created a battery of words new to the Houyhnhnm language—words Gulliver found it necessary to convert to such barbaric neologisms as "Polarized, Restructuring, Confrontation, Wscalation." He heard of attacks on the horses' homes and public buildings, including the episode which the embarrassed horses designated "the Great Sh-t-In." (Footnotes describe similar exploits by American Yahoos at Berkeley and Columbia.)

It would be ridiculous to report that Jonathan Swift and his friend Lemuel Gulliver had perfectly reproduced the style of the early Eighteenth Century in this new adventure . . . after all, it was their style. Let's say that Professor Hodgart has not seen fit to dilute or bowdlerize it as generations of expurgators did the account of Gulliver's first four voyages. It should make our New Yahoos howl.

## THE LEAGUE OF GREY-EYED WOMEN

*By Julius Fast • J. B. Lippincott Co., Philadelphia • 1970 • 219 pp. • $5.95*

You read a one-shot version of this book in *Venture, F&SF*'s hard-to-find associate, last summer. The plot will be familiar, but Julius Fast has done his share of good SF, and he is by profession a medical journalist, so he has made the yarn almost as plausible in parts as "The Andromeda Strain."

Jack Freeman, New York medical journalist, learns he has terminal cancer and goes to Montreal



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

to beg an experimenter to use him as a guinea pig for a reported "cure." Dr. Stiener won't, but his grey-eyed assistant will and does give Freeman a very peculiar injection of DNA and other materials. What the extras are develops later in the story—but by that time Freeman has lost his cancer, become a werewolf, half turned into a fabulous bird, lived as a shark, and been trapped in a burning house from which he almost escapes as a phoenix.

If you read the *Venture* condensation, you know this is a superman—rather, superwomen—story. Their own peculiar genes surface only in women, but by chromosome conversion they hope to turn Freeman into a viable stud for their super-race. Will the grey-eyed dolls make it with our Jack? Will he make it with all of them? Will his faithful friends come to the rescue?

It's elementary enough to make a good "straight" SF movie, but I pray that the movie-makers don't get their chromosome-butchering paws on it.

**SEVEN CONQUESTS**

*By Poul Anderson • Macmillan Co., New York • 1969 • 224 pp. • $4.95*

Poul Anderson is one of a handful of writers whose work could be taken as typical of present-day science fiction. He has few great stand-out books, but he has no bad ones either, and you can reach for almost any Anderson book or story with a guarantee of satisfaction if not titillation.

Macmillan published this seven-story collection almost without promotion. Its theme is institutionalized violence, seen in the shifting perspectives that only science fiction has at its command and that Poul Anderson uses more effectively than most. As he points out in his introduction, despite the books and essays of Robert Ardrey and others, we still don't know why men fight, but we can explore the many possibilities through such stories as those he has told here and elsewhere, and in the process perhaps gain some of the insight which Judith Merril once mentioned as an attribute of pre-New-Wave SF.

"Kings Who Die" was in Miss Merril's eighth annual anthology, as one of the best stories of 1963. War on Earth has migrated into space, and an American captain is wounded and captured by the United Asians, controlled by a man who has been melded with a computer. He argues persuasively that Unasia must win—that he has made it invincible—but Captain Diaz has also been made part machine.

In "Wildcat" the Transtemporal Oil Company, under martial law, is drilling for oil a hundred million years in the past, to meet the country's military needs. But there is



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

another, secret purpose for the expedition, and one of the responsibilities of command is to keep that secret, however horrible it may be.

"Cold Victory" is quite short. This time it is ideological war . . . a technological counterrevolution against the Humanist revolutionary government of Earth, with Mars and Venus drawn in. But the ultimate weapon is psychology, when brother captures brother.

"Inside Straight" carries the war out among the stars. An agent finds New Hermes an extraordinary planet, where gambling is an obsession—and a defense. He gambles . . . wins . . . loses.

"Details" raises a vital question: even if we know how to shape a society without war—will we? Interstellar agents planted on Victorian Earth are doing their best, aided by expert psychotechnicians, but people refuse to react rationally and the most trivial details upset the equations.

Or, if we do make men incapable of warfare as in "License," what happens to the innate violence bred into men? Ritualize it? Institutionalize it? Unionize killing and robbery? I wonder just how close we have come to accepting a predatory class with a Mafia elite and the cost of killing and robbery seen as cheaper than providing jobs, homes and universal justice? This story comes closer to possibility than any of them. As a story per se, it's a fast-moving yarn about a contracted kidnapping.

But, "Strange Bedfellows" points out, a sane society may have insane members. Sevigny, Cytherean engineer on the Moon, finds that the pressure is relieving itself in carelessness, in small accidents . . . and in sabotage. Since the project is terraforming the Moon—by a process that sounds worth trying—a variety of people and organizations can profit: corporations, religious fanatics, conservationists, politicians. Sevigny finds himself up against an unholy alliance with axes to grind—and swing at his neck.

Nothing great, but not a lemon in the basket.

### SHADOW OF HEAVEN

*By Bob Shaw • Avon Books, N.Y. • No. S-398 • 175 pp. • 60¢*

The North Irish inventor of "slow glass" has earned his place among the immortals of science fiction with that one concept alone, but he has plenty of other original ideas in him. In this book, the theme is the overcrowded world of the future, where a few maverick refugees have found a home on floating islands in the sky —robot-operated vegetable gardens, suspended by antigravity three miles above the surface of the jam-packed Earth. To one of these islands, International Land Extension U.S. 23, reporter Vic Stirling goes to look for his miss-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ing half-brother . . . and finds him the dictator of a refugee colony in "Heaven."

Meanwhile, back in the dormitory megalopolis, the Food Technology Authority, which mines the seas for food concentrates, is fed up with the aerial vegetable gardens and has decided to take them over as parks and recreation centers for their own elite. The immediate result, of course, is war between the squatters and the FTA . . . a civil war which Johnny Considine converts neatly into a war against the entire Establishment. The would-be bystander, Vic Stirling, finds himself thoroughly involved.

It's the kind of story Robert Heinlein would once have written, but definitely up to date.

**THE BEAST THAT SHOUTED LOVE AT THE HEART OF THE WORLD**

*By Harlan Ellison • Avon Books, N.Y. • No. V-2300 • 254 pp. •75¢*

I hope that Professor Willis E. McNelly of California State College at Fullerton, who writes a special foreword on the year's SF novels for "Nebula Award Stories Four," will forgive me for using his comment on Ray Bradbury to describe quite another person and writer, Harlan Ellison:

". . . His concepts seize him, shake him, and emerge explosively . . . into a short story."

That's Harlan Ellison. And that is "The Beast That Shouted Love, etc., etc."

Small wonder that Harlan is the principal U.S. prophet of the "New Thing" in science fiction—or speculative fantabulation, if you prefer. He needs new ways, new themes, new values—anything to shock his readers out of lethargy. In this collection from many sources, he does it as well as he ever has.

The title story won a "Hugo" award. This unexpurgated version is not so different from the magazine story as Harlan insists in his typical and revealing introduction. (I am sure some people read his books entirely for the introductions.) It gives the universe—the worn old SF universe of multiple alternate worlds—a structure that Dante might have appreciated. "A Boy and His Dog," which closes the book, is also a little harsher, a little bit more ruthless than it was in the *New Worlds* version and in other reprints. It shows us a future in which ghetto culture—an evolved ghetto culture—has evolved a nuclear holocaust. A few of the elite protected themselves underground.

"Shattered Like a Glass Goblin" is really fantasy, but it is probably the best story in the book—an evocation of the drug culture in terms of a bad trip that is somehow real. I'm told the story has put Harlan in the doghouse with the set who are accused of miscellaneous butchery in California. "Along the



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Scenic Route" does the same sort of thing for the drag-race culture by projecting a future in which rodders duel with their cars.

There are fifteen stories in the book, all of them experiences. "Phoenix" is, of all things a trick-ending story about a grim future Earth. "Asleep: With Still Hands" shows a world in which war has been outlawed by a mental-control machine deep under the Sargasso. Two rival forces try to shut it off. (I think this is the least successful of the lot.) "Santa Claus vs. S.P.I.D.E.R." was a James Bond parody written as a Christmas story for *F&SF* . . . or maybe it's a Matt Helm film parody, or a parody of parodies.

"Try a Dull Knife" is another Los Angeles underground story—the same world that produced "Glass Goblin." "The Pitll Pawob Division"—very short, very alien. "The Place with No Name"—a nightmare about the pimp who rescued Prometheus. "Run for the Stars"—1957 *S.F. Adventures* yarn about the man sent out with a bomb in his stomach, still pure Ellison in its intensity. "White on White"—very short horror story with a gimmick, from *Knight*.

"Are You Listening?"—a parable, really, in which a nothing man becomes literally nothing. "S.R.O."—a show-spaceship docks in New York. "Worlds to Kill"—Earth invasion, by creatures as strange as any you've ever encountered. And that's it. Ideas. Ugly, nightmarish visions. Violence and more violence. It's the world Harlan sees around him. It's the universe he shows us.

### CAPTIVE UNIVERSE

*By Harry Harrison • Berkeley Books, N.Y. • No. X-1725 • 160 pp. • 60¢*

For the first fifty pages you'll swear that Harrison has been rummaging in an old trunk. Here is that tired old theme from "Tom Swift" and even before, the lost community of Aztecs who have been cut off in a hidden valley by a landslide centuries ago. Presently they will discover the outside world—our world. The stalwart young Aztec maverick may even fall in love with the beautiful white explorer . . .

Of course, any reader of this magazine should know Harry Harrison better than that. There are rumblings, even in the first chapters. The Aztecs are blond—that old Fair God bit again? Someone is feeding the vultures meat from an unspecified source. And surely we're not supposed to accept a snake-headed goddess?

Trust Uncle Harry. On page 55, young Chimal follows the goddess through a secret door in the cliffs, with his whole tribe hunting him, and the story turns inside out. His sealed valley is a prison, guarded and observed by a strange breed of people with an advanced tech-



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

nology . . . people who in some ways seem almost as backward and tradition-ridden as his own villagers. Soon he is a fugitive from both groups, and finds himself standing on the sky, with his valley arched above his head.

I have only one quibble. Those who know tell me that an obsidian knife, made the Aztec way, is a lot sharper than steel and easier to keep that way.

### THE ICE SCHOONER

*By Michael Moorcock • Berkley Books, N.Y. • No. X-1749 • 207 pp. • 60¢*

American readers know Michael Moorcock mainly for his sword-and-scorcery yarns and as editor-publisher of the new *New Worlds*, the English avant garde magazine that uses a great deal of science fiction and fantasy. This book was originally serialized in a now defunct companion magazine, *SF Impulse*. It is a fairly conventional exploration-and-adventure yarn whose distinction is that it is laid on an Earth in the depths of a new glacial period—one in which the entire planet is frozen from pole to pole.

Konrad Arflane is the out-of-work skipper of an ice ship in one of the cities of the frozen plateau that was once the Matto Grosso of Brazil. In the Eight Cities men still live, still sail the glacial ice to hunt the gigantic land whales and other adpated beasts, to trade a little, and to prove they are men. Arflane rescues the head of one of the great families, and in time finds himself leading a foolhardy expedition to find the mythical New York. And that, despite mutiny and treachery, is what he does.

I suppose the basic premise is untenable. An Ice Age comes too rapidly for the massive biological adaptations that return whales and seals to land to have occurred. With no plant life, there would be no biological chain for the conversion of solar energy—and no oxygen. But Moorcock has invented a fascinating setting and fitted a fascinating society to it. You'll enjoy the way he's done it.

### GRIMM'S WORLD

*By Vernor Vinge • Berkley Books, N.Y. • No. X-1756 • 176 pp. • 60¢*

You may have seen the first part of this story as "Grimm's Story" in Damon Knight's "Orbit 4" anthology of new SF. It was the story of a young astronomer who allowed himself to be enlisted in a campaign to rescue the only complete file of the seven-hundred-year-old magazine, *Fantaisie*, from a potlatching tyrant—only to find that the crusade had quite another purpose. The magazine's current publisher, Tatja Grimm, was about to set herself up in the tyrant's place.

The rest of the book carries the action from the kingdoms of the



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

archipelagos to the planet's single continent, where two emissaries from a galactic civilization have involved themselves in the politics of the almost forgotten water-world. They join forces with one of the pair, and learn that their world is being used as a breeding pen by the star folk. It is now harvest time: a percentage of its population will be carried off, slaughtered, and their brains used to control *golems*—slave machines, on which the galactics rely for their labor.

So Tatja Grimm is soon leading a fight to save herself and her newly won kingdoms—except that there is a little ambiguity about which side she is on, and who she really is.

No prizes expected and none likely, but a relatively new writer has created a thoroughly original world that you'll enjoy.

*HEINLEIN AGAIN*

You probably know that the Flower Children have taken "Stranger in a Strange Land" to their psychedelic hearts and accepted it as the Word of the Guru on love and sex. As a result, it's back in a new reissue with a new cover and the paperback publishers of his other books are eagerly getting out new editions. As of the moment, this is the state of the art—not all the Heinlein in print, but the latest to appear: three novels and two short story collections.

**DOUBLE STAR**

*By Robert Heinlein • Signet Books, N.Y. • No. P-3669 • 128 pp • 60¢*

The actor who stood in for a politician; here in 1956.

**THE MOON IS A HARSH MISTRESS**

*By Robert A. Heinlein • Berkley Books, N.Y. • No. N-1601 • 302 pp. • 95¢*

The pb of Heinlein's last novel—one that should set the "Stranger" disciples back on their bare behinds.

**STRANGER IN A STRANGE LAND**

*By Robert A. Heinlein • Berkley Books, N.Y. • No. N-1571 • 414 pp. • 95¢*

The most un-Heinleinish of Heinlein's novels.

**6 X H**

*By Robert A. Heinlein • Pyramid Books, N.Y. • No. X-2023 • 191 pp. • 60¢*

Including the unparalleled "All You Zombies," which ties the time-travel paradoxes in a hard knot. Originally titled for another story, "The Unpleasant Profession of Jonathan Hoag," an Unknown Worlds nasty fantasy.

**THE WORLDS OF ROBERT A. HEINLEIN**

*Ace Books, N.Y. • No. 91501 • 189 pp. • 60¢*

Five reissued classics, including "Blowups Happen" and "Solution Unsatisfactory."



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

### THE HIGH CRUSADE

*By Poul Anderson • Macfadden-Bartell Books, N.Y. • No. 60-349 • 160 pp. • 60¢*

High adventure, as literally as you could ask. In 1345 A.D. a small band of knights captured an invading spaceship and set out among the stars. It originated here in 1960, and it's grand reading.

### WHO?

*By Algis Budrys • Lancer Books, N.Y. • No. 73-810 • 191 pp. • 60¢*

This must be at least a re-re-reissue: a spy story with a difference.

### THE JEWELS OF APTOR

*By Samuel R. Delany • Ace Books, N.Y. • No. G-706 • 159 pp. • 50¢*

I loved it when it was a new author's first book. He's revised it for this reissue . . . rather, Ace says they cut about a third out of the original version and have now restored it. Poet, musician, mathematician, Delany—happily—doesn't fit anybody's mold.

### TOO MANY MAGICIANS

*By Randall Garrett • Curtis Books, N.Y. • No. 123-07022-075• 238 pp. • 75¢*

Randy Garrett doesn't fit molds either—and when are we going to have another in this series about a parallel world where magic works, and where locked-room mysteries still obey all the laws of Carr. Here in 1966.

### THE ANYTHING BOX

*By Zenna Henderson • Avon Books, N.Y. • No. V-2264 • 191 pp. • 75¢*

Zenna Henderson's stories have a humanity all their own. These are not in the series about "The People."

### THE COLOUR OUT OF SPACE

*By H. P. Lovecraft • Lancer Books, N.Y. • No. 74-501 • 222 pp. • 75¢*

It's been pointed out that H. P. Lovecraft wrote all his weird horror stories *as if* the world of powers and monsters he described were real and subject to its own consistent "scientific" laws. This collection begins and ends with two stories that almost everyone accepts as "real" science fiction: "The Colour Out of Space," which was one of the masterpieces of *Amazing Stories* early years (1927) and the long "Shadow Out of Time," which appeared here in 1936.

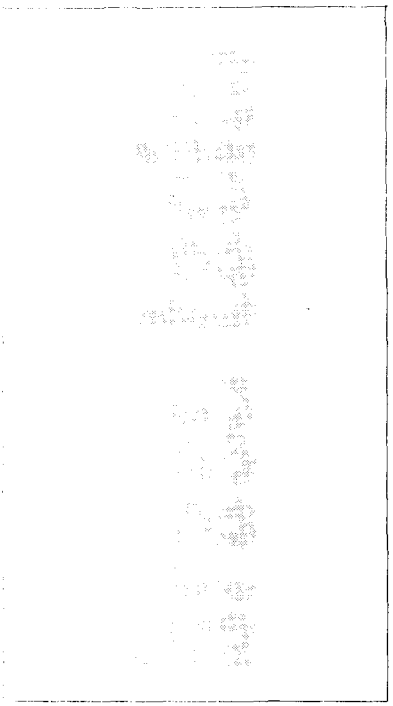
### THE SHRINKING MAN

*By Richard Matheson • Bantam Books, N.Y. • No. H-3970 • 188 pp. • 60¢*

Needless to say, this yarn has all the scientific flaws that all shrinking man stories have, from Ray Cummings on down. It's still a gripper. New pb publisher; new cover illo.



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Dear Mr. Campbell:

Recently one of the news magazines printed a letter by a reader who wished that he could personally smash all the guns in the USA. Unfortunately, he is as poorly off as the mythical Greeks who wanted to stuff the world's troubles back in Pandora's box. The secret's long out, and too simple to suppress . . .

A couple of summers back, I visited a community that should have been ideal, according to some theories. No unemployment, housing for all, basic necessities of life all taken care of, recreational facilities supplied. There were only a couple of things lacking, and that got the cons in an uproar . . .

My unit posted machine gun squads in a couple of places while we waited for peace to break out. The guards showed us a sizable collection of knives, stilettos, bludgeons, and aids to travel outside the place, et cetera. There was one small speargun in the group, short ranged but deadly enough.

Since then I have seen an article on prison weapons which featured "zip" guns and pen guns, et cetera, mostly made of pipe and the like. In most cases, the cartridges were crudely made with match heads for powder, or else smuggled ammo was used. However, one piece from San Quentin was out of this class, being a miniature of the M3 Grease Gun SMG, aside from having electric ignition off batteries! The ammo was made by the builder, and it worked well enough to get him out of the place for a while.

A person outside the jug could do far better, as in the case of the Danish underground, either the Holger Danske or BOPA group, which made a hundred or so Sten guns from plans the British supplied, during German occupation. The plant made stuff for the Nazis in the day, and the night shift made Stens.

Then there was the zealot associated with the Minutemen who had



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a project in high school shop, which his teacher thought was a lubricating device. Actually it was a submachine gun. He did time in later years, learned machine shop methods of more advanced sorts, and has been doing even more things since.

We shouldn't forget safe armament, too. Nonlethal weapons are much dwelt on lately, but Mace has been misused a number of times, not as a precision item to nail a couple of people in a mob, but to paint around a victim's eyes, as was done in an Ohio college disturbance. A suspiciously shaggy person treated this way turned out to be a reporter, and the effects lasted quite a while. There have been other reports. After all, the stuff is safe, isn't it? Lay it on heavy and the hell with the instructions. They're for people with time to read.

Some of the long-haired crowd don't like Mace, and have been reportedly carrying spray cans of innocent oven cleaner, loaded with NaOH solution. Anyone for an eye full of lye? I don't dig peaceful types like that. Hell, almost any spray can temporarily blind and some can do it for good.

And then we have lethal nonweapons, which no one expected to find used for killing, like the umbrella an exasperated Columbus woman threw at her lagging son to hurry him up. She didn't expect it to fly like a javelin and pierce his skull. There is no thing which cannot be used to harm, given the desire to do so.

And there was the soldier hobbyist in Vietnam a while back, who was weaponless during a VC charge. So he took his hobby to them seriously. He recovered four arrows and thought the VC was checking the other four to see what sort of armament they were. One of the oldest projectile weapons can still lay people out as well as in the days of Sennacherib.

JOHN P. CONLON
52 Columbia Street
Newark, Ohio

*I understand that one brand of hair spray—available at your local drugstore for a while—could be combined with a cigarette lighter to make a first-class flame-sprayer. A fact discovered and used by some "peaceful protestors" playing "bait the fuzz."*

Dear John:

In the January issue of Analog on page 12 in the article, "What Supports Apollo?," the authors state that the Vehicle Assembly Building "is nothing less than the world's largest structure," and, "No enclosed space built by man is larger." The total volume of the VAB is 129,482,000 cubic feet.

However, the most capacious building in the world is the main assembly building at the Boeing Company's works at Everett, Washington. It has a capacity of 160,000,000 cubic feet. It has a



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

maximum height of 114 feet and encloses a floor area of 1,565,000 square feet (36.0 acres).

Even more massive is the Cholula Pyramid at Cholula de Rivadahia, near Puebla, Mexico, with a total volume of 4,300,000 cubic *yards.*

RICHARD T. HANSEN
P. O. Box 282
Provo, Utah 84601

*Boeing's assembly plant I'd heard of—but that pyramid's only 116,000,000 cubic feet. If you consider rubble-filled structures, how about that earth-fell dam on the Platte?*

Dear Mr. Campbell:

Serendipity, Inc., a human factors engineering organization, is working on a NASA contract (NAS9-9338) to establish preliminary design and engineering data for off-duty activity equipment and facilities for advanced sports which could be performed in one third or zero gravity in a confined space. We would like to enlist the support and ideas of your readers and staff.

Two recreation facilities are presently under development. The first is planned for zero gravity with a crew size of six to twelve men. This would be half of a twenty-two foot diameter cylinder, 78 inches high. Because of overall mission requirements, it is unlikely that all of the crew members would be in the recreation facility simultaneously. The second facility would be part of a large space station with a crew of fifty to one hundred men. This station probably will rotate at a speed sufficient to give approximately one third Earth's normal gravity. One half of a thirty-three foot diameter cylinder, 78 inches high, is planned to be apportioned to exercise equipment and sports.

We would appreciate any ideas for sports or exercise devices which would be interesting and enjoyable in confined spaces under these conditions. Unfortunately, due to weight and volume restrictions, it will be impossible to put into effect those which require large or complex equipment. We would be happy to receive any ideas; however far out. Unique ideas used in our final report will be properly credited and a copy sent to the individuals concerned. We appreciate your help in this interesting problem.

JOHN W. EBERHARD, PH.D.
Program Director
Serendipity, Inc.
Eastern Operation Div.,
2001 Jefferson Davis Highway
Arlington, Va. 22202

*Here's a real opportunity for putting your science-fiction wits to work on a useful, needed project! As a start—how about a modified basketball game using about a 7 kilogram ball. Try passing that mass while you're in zero-G conditions!*



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

**CLIFF-HANGER**

*continued from page 8*

a speed ticket—it was a velocity ticket. He was going the wrong way on a one-way street.

The essence of a rescue-in-space mission would have to be getting there before the consumables were exhausted.

Fueling up giant boosters such as the Saturn V is not something that's undertaken on a basis "We'll have her filled up as soon as you've got your flight plan ready!" and men dashing out to open the valves and flood in the juice.

The first-stage booster—the Saturn V itself—burns kerosine and loxygen. That wouldn't be too impossibly difficult. But the next two stages burn lox and $LH_2$—liquid hydrogen. These two cryogenic substances are not to be treated in any cavalier fashion; the only combination known that's more dangerously explosive than that pair is $LH_2$ and $LF_2$—liquid hydrogen and liquid fluorine. Get just a *leeeetle* careless with the loading procedures of that stuff—the tons and tons of it you'll be working with—and you lose not only the booster you're working on, but the whole launch pad installation and, probably, the cryogenic equipment required to make your fuels.

A giant solid-fuel booster might be kept on hand ready—if we had a solid fuel that was energetic enough, and would remain stable for a long enough period of time waiting for a rescue call.

Present technology can't achieve that.

The Saturn V giant booster plus the various $LH_2$-lox fueled upper stages are able to boost into orbit to the Moon the command capsule, the service module and the LM. By leaving off the LM, a somewhat beefed-up service module, with even more fuel, could be headed toward the Moon.

But not so much fuel that it could race out to the Moon and scurry back to catch the falling cripple.

The net result is—"Forget it! You aren't going to have a rescue ship until we have a totally new technology level!"

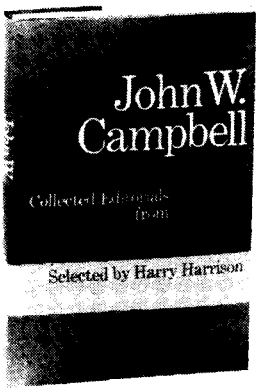
And, automatically as soon as that totally new technology level is developed, a new frontier will be opened. Immediately the real frontiersmen will take off on explorations that tax the absolute limits of that new level of technology—trips so long, so difficult for even those super-super spaceships that no rescue will be possible . . . until a newer and yet higher level of technology is reached.

And guess what's going to happen then . . .

It's like driving the family car in some respects. When I first learned to drive, 50 m.p.h. was all that was reasonably safe in an ordinary car



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED




# Analog Editorials in hard-cover form

You can now purchase Doubleday's hard-cover collection of some of Analog's best (and most provocative) editorials—"Collected Editorials from Analog." Harry Harrison—who edited the editor this time!—says of them: **"They are idiosyncratic, personal, prejudiced, far-reaching, annoying, sabotaging. They are never, never dull."**

Just send $4.95 (money order or check) with your order to: Analog, P.O. Box 4308, Grand Central Station, New York, New York 10017.


on the kind of roads you could expect to find, with the kind of tires ordinarily available.

So now we have enormously improved cars, with vastly superior springing, steering control, brakes, transmissions and bearings, tires of enormously superior toughness, and far wider, smoother, better engineered roads.

Naturally with all those technical advances, driving must be far safer now . . .

Well, at 50, it would be.

So who goes 50 when the Turnpike speed is 80?

It's human to push at the frontiers.

If you *think* you wouldn't take chances like that—how come you drive at the Turnpike speed limit?

If the accident had happened in the service module while Lovell and Haise were in the LM in lunar orbit, just before going down to the lunar surface they probably would not have been able to reattach to the command module. We would then have had the optimum situation for a rescue flight—the LM in a stable lunar orbit, with maximum supply of consumables.

Sorry—before a rescue ship could take off from Earth (assuming it were already loaded, on the launch pad, and ready to go) and rendezvous in lunar orbit, the two would have died. Carbon dioxide is poisonous if it builds up to 5% or so; the lithium hydroxide canisters



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

weren't meant for that long a stay. The extra ones that would be needed were in the command capsule.

The time to rendezvous is the factor that stops modern technology—just as the time to reentry was *the* critical factor on the actual Apollo 13 mission.

And the fundamental fact remains that when you're exploring the frontier of Man's farthest reach—there is no one to haul you out of trouble. If there were, it wouldn't be the farthest reach.

What saved the Apollo 13 astronauts was a combination of imaginative planning ahead, ingenuity on the spot, and all-out cooperation from the men on the ground. Plus, of course, the fact that NASA sends no cowards and no fools into space. Anyone who didn't feel fear in that spot would have been a fool—but anyone who lost his wits would have been a coward.

The men who support Apollo on the ground could and did help, but it was up to Haise, Lovell and Swigert to rescue themselves, because only they could *do* anything—Ground Control could only suggest. The men on the ground could make experiments for them—as in the question of how to make command capsule lithium hydroxide canisters work in the LM circulation system. (Put the canister in a plastic sack, stuff something like a sock in end A, plug a spacesuit hose into end B, and use sticky tape . . .)

The main thing Ground Control could do was use the great radar units scattered around the Earth to "feel" exactly where they were, and exactly how fast they were moving in exactly what direction. That data was fed into the giant electronic computers to solve the equations of celestial mechanics that would tell them just how to get back to Earth safely.

Before the great computers became available, solving those equations of motion—they involve the gravitational influences of Earth, Moon and Sun on Apollo 13; for the required order of accuracy we can omit the effects of Venus, Mars and Jupiter—would have taken something like six months for the first solution. Every time there was a "burn" to throw the ship into a new and more accurate orbit, the problem had to be re-solved on the basis of the new data.

In other words, hand-plotted data for the return flight would have been ready along about mid-1973.

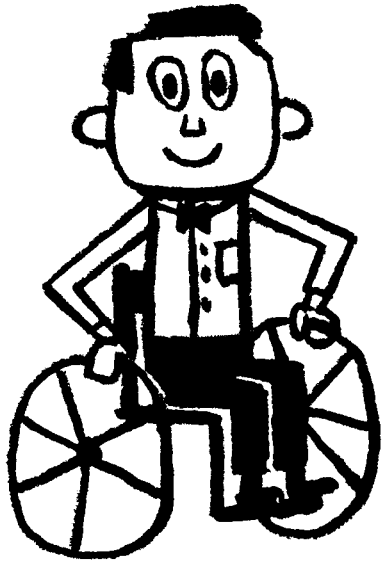
It wasn't just rocket technology that made the flight possible!

Underlying the whole thing, of course, was the astronauts' original statement of the case to Houston: "We have a problem here . . ." Problems are, of course, things that engineers solve for a living.

So they did. ■



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



# Not everybody gets M.S.

# Most often it's mommies and daddies.

M.S., Multiple Sclerosis, strikes between the ages of 20 and 40. We don't know why. Nor do we know the cure. It damages nerve tissue, often disabling its victim.

In the case of young mothers and fathers responsible for small children, the burden can be intolerable. With heavy expenses and curtailed income the family unit undergoes strains that threaten its survival.

The answer is in your pocket. Give.

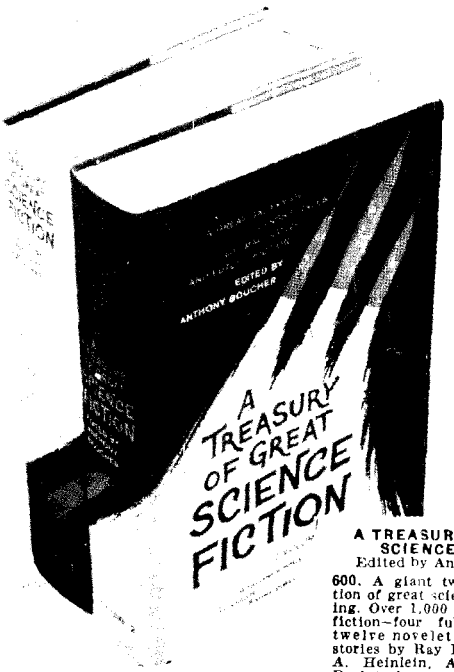
You give hope because you help continue the world wide research that must eventually find a cure. You give help because your gift provides medical and other aid to assist the patient to lead a useful and fruitful life, even with MS.

Send your donation to your local chapter of the National Multiple Sclerosis Society.

**ive to fight Multiple Sclerosis. The great crippler of young adults.**

ATIONAL MULTIPLE SCLEROSIS SOCIETY 257 Park Avenue South, New York, N.Y. 10010

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED




when you joi
Science Ficti
Club and ag
accept only f
during the co

## YES—even the two-volume set at counts as only a single choic

Each month it really superb new science fact or fiction a fraction of its regular price. Even thou books sell for $4.95, $5.95 and more in th inal editions. Club members get them $1.49 each—in special full-length, hard-co tions—unless you select an extra-value slightly higher price. And the Club tell advance what each monthly selection During your trial membership, you agree as few as four books in the coming year any time thereafter.

If not delighted wit ductory 3-book shipment, return books w days to cancel membership. Otherwise be enrolled in the Club as a Trial Memb coupon today to Science Fiction Boo Garden City, New York 11530

**A TREASURY OF GREAT SCIENCE FICTION**
Edited by Anthony Boucher

**600.** A giant two-volume collection of great science fiction reading. Over 1,000 pages of exciting fiction—four full-length novels, twelve novelettes, eight short stories by Ray Bradbury, Robert A. Heinlein, A. E. van Vogt, Poul Anderson, Arthur C. Clarke, Theodore Sturgeon, Alfred Bester, and a dozen more. Counts as 1 choice. Pub. ed. $5.95

**SCIENCE FICTION BOOK CLUB**
**Dept. 08-AEX, Garden City, N.Y. 11530**

Please accept my application for membership and rush the 3 books whose numbers I have printed below. Bill me $1.00 plus a modest shipping and handling charge for all three. Each month send me the Club's free bulletin, **Things to Come,** which describes coming selections. If I do not wish to receive the monthly selection or prefer an alternate, I simply give instructions on the form provided. For each book I accept, I pay $1.49, plus shipping and handling. Occasional extra-value selections are priced slightly higher. I need take only 4 books in the coming year and may resign any time thereafter.

**NO-RISK GUARANTEE:** If not delighted with my introductory package, I may return it in 10 days and membership will be canceled. I will owe nothing.

[ ] [ ] [ ]

Print Name _____

Address _____

City _____ State _____ Zip _____

If under 18, parent must sign here _____

Members accepted in U.S.A. and Canada only. 22-S76

**606. The Beast That Shouted Love at the Heart of the World,** by Harlan Ellison. 15 tales—including Hugo & Nebula Award Winners.

**618. Dangerous Visions,** Anthology of 33 original stories never before in print by Sturgeon, Anderson, others. Pub. ed. **$6.95**

**622. The Foundation Trilogy,** by Isaac Asimov. The ends of the galaxy revert to barbarism. Pub. ed. **$10.50**

**615. Stranger in a Strange Land,** by Robert A. Heinlein. He knew the Martian love secret—and it spelled his doom. Pub. ed. **$6.95**

**642. Stand on Zanzibar,** by John Brunner. Extrapolates today's society into 21st Century. 600 pages. Pub. ed. **$6.95**

**629. The Illustrated Man,** Ray Bradbury. 19 stories, "Intensely real." *N. Y. Times.* Now a hit movie! Pub. ed. **$4.50**

**625. World's Best Science Fiction 1969,** By Vonnegut, Jr., Sheckley, Delaney, Knight, Aldiss, and others.

**637. The Left Hand of Darkness,** by Ursula K. LeGuin. Finding love—in a "Unisex" world! Nebula Award winner. Pub. ed. **$4.95**

**279. Science Hall of F** 26 "winner sen by Sci ers of Ame Robert Sil Pub. ed. $7

**623. 2001: Odyssey** by Clarke. S n computer cosmic trap". Pub.

**621. Three morrow.** by Silverbe lazny, Blis word by Ar Clarke. P **$5.95**

**619. I Sing t *Electric!*** Bradbury. pieces—Bra first coffee five years. **$6.95**

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED